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T. A. RICKARD . . . . . EDITOR
FREDERICK HOBART, CHARLES S. PALMER . . . ASSOCIATE EDITORS

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EDITORIAL.

OF COURSE, all mining shares are more or less susceptible tothe changing moods of the stock market; but the recent violent fluctuations in Amalgamated Copper constitute a striking comment on the policy of secrecy. No man outside the immediate management can say what is the property of that company, what are its earnings or its financial condition at any time. The stock is, therefore, peculiarly open to the attacks of speculators. Any one who has, or pretends to have, knowledge, can command attention, and send the stock down by playing on the fears of its many holders, as he could not do if they were properly informed.

WE ARE GLAD to know that Mr. E. C. Brown, of *The Progressive Age*, has in hand the preparation of a biographical directory of engineers in America, a sort of professional peerage. We hope that he will be facilitated in this useful work by all who find themselves chosen to appear in this 'Who's Who' of our profession, for it is obvious that a book of this kind is needed.

THE RECENT judgment for heavy damages against a smelter in the Bingham district, in Utah, for injury done to farming property by sulphurous fumes, brings up again the controversy which raged years ago in Butte, and since then has broken out in California, in Vermont and in Tennessee. Probably it never will be settled, though it is to be hoped that some commercially practicable method may be devised of utilizing the sulphur which is now a menace to adjacent property.

ON ANOTHER page we publish an abstract of the paper by Messrs. Butters and Hamilton on 'Re-grinding at El Oro.' This is a type of technical literature which deserves high commendation, because it gives the result of the most recent investigation into an important subject. The authors say, in words that cannot be bettered, that "in the earlier days of gold mining, such figures as are contained in this paper would never have been given to the public; but the old policy of secrecy in sueh matters is gradually passing away, and mining companies all over the world are beginning to see the advantage of thus comparing notes with one another—a course which has resulted in

an enormous increase of knowledge in general." This is true, but it applies as yet only to the most progressive companies and the most enlightened men. There are many avenues of technical information still darkened by narrow-minded notions of the value of secrecy.

THE FATAL FIGHT at the Witwatersrand (Knight's) mine on Monday last between Kaffirs and Chinamen we suppose must be classed among 'labor troubles,' although there is no reason to believe that the native African resents the intrusion of the Asiatic in an economic sense; it is probably the result of instinctive racial antipathy. In October there was a small riot at the French Rand mines, near Krugersdorp, though no lives were lost; but in this last affray three Kaffirs and one Chinaman were killed, while thirty more belonging to both sides were wounded.

THE COLD weather of the past week has put an end to Lake navigation, and may stop some of the scattering ore cargoes which left the Lake Superior ports after December 5, the date to which insurance was limited. November shipments have not yet been fully made up, but it is known that they were very large. They will probably bring the total movement of iron ore by lake up to more than 20,000,000 tons, while rail shipment will probably make the total not far from 21,000,000 tons—a figure far higher than was expected in the first months of the season.

WE NOTE THAT the daily press contains a disclaimer of identity made by the International Nickel Company, which desires to prevent confusion with the American Nickel Company. The latter has endeavored to distribute its stock by advertisements of a dubious character, and we do not blame the International Nickel Company for its protest. Similarity of name has often misled mining investors, and we would have referred to this instance at an earlier date had we believed that our readers bought shares on such questionable data as those given by the American Nickel Company.

THE AGITATION on the part of the miners' organizations in France has resulted in the adoption by the French Senate of a bill providing for the limitation of hours of labor in the coal mines; this bill has been returned to the Chamber of Deputies, and is now under consideration by a commission appointed by the Chamber. The law is very strict in its provision, which requires the immediate adoption of a day of nine hours, the time to be calculated from the entrance into the mine, to the return to the surface, thus including the time occupied in going from the surface to the working face and in returning. Two years from the day of the final adoption of the law, the duration of a day's work will be reduced to eight and a half hours, and at the end of a further period of two years, eight hours will be the limit. The law is compulsory in its terms, and permits no working over a longer period, except in case of accident, or where additional work is needed to maintain the security of the mine, and in that case the working day can only be lengthened by a special permit from the chief government inspector. The passage of this law is strongly opposed by the large coal mining companies, but present indications are in favor of its final adoption. In that case France will be the first European country to establish a compulsory eight-hour day in coal mining.

THE BASIS OF VALUE.

The recent break in the share quotations of the Amalgamated Copper Company and the Greene Consolidated Copper Company doubtless illustrates several of the vagaries of human nature and some of the eccentricities of speculation; but unlike as these two undertakings undoubtedly are in many respects, they bear one resemblance in the lack of proper information given to shareholders. It is manifest that when either the financial conditions or the metal markets affect adversely the quoted value of mining shares, those will suffer most which are rendered vulnerable by absence of reliable information. The daily press may very properly sneer at Mr. T. W. Lawson and attempt to deny him his hard-bought notoriety by referring to him as "a Boston operator"; but the fact is that neither he nor any other adventurer could depress a security such as Amalgamated if it published proper reports and balance sheets. As it is, the helpless speculator knows nothing of the assets or of the intrinsic value of the property represented by his share certificates; it may be a South Sea bubble of iridescent air, and he might as well throw his money on the roulette table. We venture to say, however, that if a proper accounting of the business were given, accompanied by reports on the physical condition of the mines by the technical chiefs, such men as Mr. Benjamin B. Thayer or Mr. Charles W. Goodale, the value of Amalgamated shares would rest on a solid basis of fact. Similarly, in regard to Greene Consolidated, splendid mine as it is, nothing definite or satisfactory is given in the reports issued to shareholders. Vague and flamboyant statements are issued by the president and a handsome production is undoubtedly being made, but none of the usual and proper estimates of ore reserves are given to the shareholders—and without these, as we pointed out last week, the rate of dividend, cost of copper, and so forth, are illusive. Here again, we venture to say that if such members of the management as Mr. Arthur S. Dwight or Mr. W. B. Devereux were to make a report on the ore reserves and future prospects, there would be given a stability to the investment in this copper mine such as it can never possess under existing circumstances. Whether people buy as gamblers or as investors, sooner or later they must face the facts, and the fundamental fact in a mining enterprise is the known quantity of ore in the mine.

VENTILATION BY LAW.

In the latest annual report of the Bureau of Mines of Pennsylvania, Mr. Roderick, chief of the bureau, calls attention to the present law relating to the ventilation of mines. This requires a supply of 100 cubic feet of air per minute in ordinary coal mines for each person employed in the mine, and 150 feet per minute in mines known to be gaseous, or fiery. The law empowers the mine inspectors to require more if they believe it necessary; but this provision has been a dead letter, since the courts have held that mine operators cannot be held for violation as long as they provide the specific quantity of air named in the law. The report urges an amendment striking out the specific provision, and placing the quantity of air to be furnished largely in the discretion of the inspector. The requirement of the law will then be that the supply of air must be sufficient to carry off all noxious gases, or to dilute them to a point where they will not be dangerous. Whether this is done or not must be determined by the judgment of the inspector. His remarks are given on another page.

In his opposition to the maximum requirements as now fixed, Mr. Roderick is undoubtedly right. In every mine much will depend on the local conditions, and these will change from time to time. In many mines 100 or 150 cubic feet of air per minute per man employed is an ample supply. There are other cases, however, where 250 feet, or even more, would not be too much—in some mines double that might be needed. No hard-and-fast law can provide for all the changing conditions, and if it provided for extreme cases, it might put the minimum so high as to work injustice in others. If a wider range of minimum requirement is made, then much will have to be left to the judgment of the inspector. The question is, whether it would not be better to name no fixed quantity in the law, and so provide no limitation behind which the mine operator can shelter himself or can demur to the inspector's requirements, as has been done under the present system.

The objection is made that such a rule would give too much power to the inspectors, and would make an opening for a dishonest official to harass an operator or to levy blackmail. Of course, such a possibility exists. The mine inspectors of Pennsylvania are, we believe, as a rule, capable and honestly desirous of performing their duties properly and protecting employees in the mines. There is always a possibility, of course, that a man might secure an appointment who would be willing to connive with a grasping and careless operator for the sake of gain, and the law will meet such a contingency only by providing for punishment

after the offence has been brought to light. And that would probably not be done until a disastrous accident had occurred, with lamentable loss of life. We have had parallel cases, in steamboat inspection, for instance, where the requirements are much more clear and simple than in mine inspection.

Then, too, a mine inspector, however capable and honest, is not infallible. Unreasonable requirements might be made, through an honest mistake in judgment, and the operator might be put to causeless expense. It is true that the mistake might be on the right side, and that an oversupply of air will do no harm; but justice is due to the manager and operator as well as to the miner. The difficulties in the case are considerable, from any point of view.

It is quite possible that there may be over-elaboration in mine laws, which will work to the disadvantage rather than the benefit of the employee. The tendency at present is rather in that direction. In case of accident, the operator can escape liability if he can prove that he has complied with the letter of the law, and that cannot be made so complete as to provide for every contingency.

The true policy is that often advocated by the late Richard P. Rothwell, and that is, to do away with all provisions of law except those relating to a few generally accepted rules. The substitute would be a law holding coal mine operators strictly to account, and making them liable to heavy damages for all casualties; at the same time putting the burden of proof on the operator. That is, the claimant should be required to prove simply the fact of injury received, and the operator could meet this only by showing the good condition of his mine and machinery, and the sufficiency of the ventilation, if called in question by the nature of the accident, or the fault of the miner himself. The point is, whether the fear of heavy damages would not go further with many men than the desire to comply with law, or regard for the safety of their employees. It is only too probable that the prospect of money loss is the stronger motive with the majority.

THE MEANING OF A HYPHEN.

Careful phraseology is of especial value in geologic description or other technical literature. The writer who can put on paper exactly what he means will be read and understood, where the man of cumbrous and uncertain language finds that he fails to interest. Even such a little thing as a hyphen has a meaning, and its correct use serves to make clear, just as its incorrect use renders obscure, an intended meaning. Take the phrase "gold and zinc-slime smelting"; as here written it means the smelting of gold and of zinc-slime; but written "gold-and zinc-slime smelting," it means the smelting of gold-slime and zinc-slime. The use or non-use of the hyphen is often equivalent to changing the preposition, and consequently the meaning. A 'wire rod' is a rod made of wire, but by introducing a hyphen 'wire-rod' means a rod from which a wire may be drawn. Any snake of the correct color may be called a black snake; but the *coluber alleghaniensis* of the Pennsylvania coal region is a true black-snake, and a healthy constrictor, as those know who have encountered full-grown specimens. The 'dry-blast' furnace is the most recent thing in iron ore smelting; but any old furnace that is frozen up may be a 'dry' blast-furnace. To 'retreat' is to run away; but to 're-treat' is to treat, as by a process, a second time.

A similar degree of care is desirable in writing words that are properly solid compounds. A 'timber man' is literally a man made of timber, while 'timberman' expresses one who works in or with timber. 'Orebody' is given in this JOURNAL as one word because we never speak of it as the 'body,' as one might if 'ore' was properly a separate qualifying adjective. For the same reason 'goldfield' and 'coalfield' are printed in solid form.

It is sometimes very difficult to decide whether a compound word is best written with a hyphen or as a solid word. Where the meaning is not affected, usage, or similarity to other compounds, should decide. In general, these rules may be followed: Where two words are used with the meaning of one, they should be joined with a hyphen, or printed as one solid word. Where a compound word is the name of a thing, and the latter portion of the word cannot be used alone to name it, the compound is best given as a solid word.

MINING IN FICTION.

We have not infrequently dealt with the illusions created by fiction in mining matters; there is a problem less serious, but equally interesting, presented by the employment of mining accessories in fiction.

Mr. Kipling has set an example which few of his cult can follow with safety, for his use of a technical *mise en scène* is so well done as to deceive the very elect. We do not know that he has utilized incidents connected with mining in any of his stories, but assuredly his use of nautical, mechanical and electrical environment has contributed largely to the vividness of his transcripts from current life. Mining associations often play a part in fiction; Bret Harte, in America, and Rolf Boldrewood, in Australia, have used the local coloring of California and New South Wales with telling effect. Bret Harte, at least, will be read long after the golden age of California has retreated into the unremembered past, for he struck that note of essential humanity to which men will continue to vibrate until "the leaves of the Judgment Book unfold." Besides these, few have achieved any verisimilitude with mining scenes; an exception is Mr. Frank L. Nason, who, being a mining engineer before he became a *littérateur*, has written stories, the technical details of which leave no room for criticism. 'The Blue Goose' deals with labor conditions at Telluride in a manner no less entertaining than illuminating. Similarly, Mary Hallock Foote has written several pretty stories of handsome superintendents and Boston schoolma'ams; and 'The Story of the Led Horse Claim' has charmed many beside those who have lived in the Colorado mining camp which she portrayed so successfully. Jack London and Guy Boothby have nibbled on the edges of mining romance, while Mark Twain has played upon it with his effervescent humor.

As a rule, however, it must be confessed that the writers of books flounder in an amusing fashion when they try to make 'copy' out of mining matters. Almost without exception they find nuggets in veins, they smelt gold-bearing quartz, and they dig fortunes out of the ground in a week. We have just read a thrilling story of shipwreck in the Malay archipelago, with a spirited heroine and a manly hero, who incidentally knows a thing or two about mineralogy, and consequently finds a gold mine during the period of enforced sojourn upon the aforesaid island. 'The Wings of the Morning' is a capital yarn, but the mining technique is very shaky. A quartz vein is found, it follows a fault—the evidence for which and the need of which is neither obvious nor explained; the outcrop had become a "bold panoply of stone" by reason of "the deodorizing influence of rain and sun." We will join the author in his objurgations over the typographical error which changed 'deoxidizing' in such an unsavory manner. He finds gold in the quartz, but the metal was "in a transition state between an oxide and a telluride." A specimen of this oxi-telluride would be highly appreciated at the British Museum, not to mention younger institutions of the same kind. Perhaps this is one of those scientific prophecies which have been made by accident before now. We have an oxi-telluride, or at least a tellurite of iron. With a few strokes of the pick the hero opened up this vein (while the lady held the lamp), and "each few inches it broadened into a noteworthy volcanic dyke, now yellow in its absolute purity, at times a bluish black when fused with other metals." It must have been a pretty rich vein, all right, but gentlemen of the press should note that we spell it 'dike' in America, not 'dyke,' a form which lingers only on the other side of the Atlantic. Later on he explains to the lady how he purposes making money from this discovery, and he adds that "this sort of ore requires a crushing-mill, a smelting furnace, perhaps big tanks filled with cyanide of potassium." He evidently contemplates having them all, like the old-fashioned directors, who used to come from London about twenty-five years ago to gladden the heart of Mr. Chalmers, at Chicago, by ordering plant and equipment as if they were giving an order for dinner to a head waiter whose skill could be trusted. Finally, the hero and the lady are

rescued, but they return to see the beginning of mining operations. Everything is done with a rapidity that would bring envy to the average operator of mines. "In twenty-four hours a small concentrating plant was erected, and a ditch made to drain off the carbonic anhydride in the valley." One of the open-cuts had proved gassy. A dynamo was fixed on the summit of the island to warn passing ships off the reef on which the hero and the lady had been wrecked, but as there was no running water on the island, and no fuel save a few very green palms, and as coal came from Japan by way of Singapore, that dynamo and the light which it maintained represented a luxury, the expense of which, we take it, was a measure of the gratitude felt by those who had survived from amid so many perils by land and sea. The story is well told, and was enjoyed to the full by the writer of this criticism; the technical blunders referred to did not spoil it, but it is not to be doubted that the force of the narration, and the completeness of the book as a work of literary art, would have been much enhanced had the author taken the trouble to consult some one conversant with mining.

MARKET CONDITIONS.

December 14.

As was anticipated in this column two weeks ago, the metal markets are showing a lull in business, which may be attributed partly to the unfavorable conditions on the Stock Exchange and partly to the approach of the end of the year, when manufacturers are accustomed to take stock and count up conditions. In copper there has been comparatively little interest taken by domestic buyers, and purchases for export have also been light. There has naturally been a slight recession in prices, but there does not seem to be a prospect of any considerable fall.

Business in tin has been moderate, and prices have fluctuated about as usual. In lead only the ordinary consumptive business is being done at the advanced price. Spelter is comparatively quiet, but prices remain firm, as there is no pressure to sell on the part of smelters. Prices in the Joplin ore market continue very high, and buyers are competing for ore.

Silver has been firm, under the influence of continued demand from the East. The price has gone above 60 cents for the first time in many months.

The iron markets are strong, with good demand for both raw and finished material, and advancing prices are generally in order. In pig iron and billets especially, spot material is scarce, and in several of the local markets premiums are being paid for early delivery. Further advances are expected in finished materials next week, when several pool meetings are to be held.

The Western coal markets are generally in fair shape. Demand for steam coal is good, and domestic trade has been stimulated by cold weather. Transportation conditions are not very good, and some delay has been caused by snow; while in West Virginia and in parts of Pennsylvania and Ohio drought has interfered somewhat with mining.

In the seaboard bituminous coal trade conditions continue good. The demand for steam coal is large, and apparently consumption in this line will be heavy throughout the winter. Here again there is some delay in transportation.

The anthracite coal trade has received an impetus through the coming of cold weather, and this condition promises to last.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

The heaviest atom known is uranium and the lightest is that of hydrogen.

A new use of vanadium is announced in a forthcoming invention by Wilhelm von Siemens. It concerns a vanadium glow-lamp.

Some of the desirable qualities of coke are: (1) high fixed carbon; (2) low ash; (3) low tenor in sulphur and phosphorus; (4) strong texture to carry a good load of charge.

The earth is a great magnet; but whether of the nature of an electromagnet, or a simple lodestone, is not yet known. It is possible that the earth's magnetic property may partake of both.

Recent metallurgy is witnessing the use of four comparatively rare metals. They are vanadium, molybdenum, wolframium or tungsten, and uranium; and all are used in alloying with steel.

Several newly discovered elements were named after the country where the respective mineral was found. Thus scandium refers to Scandinavia, gallium to France (Gallia), germanium to Germany, and columbium to America.

The best time to add aluminum to steel in casting is when the furnace is being tapped. It may be thrown directly into the ladle, 2 to 5 oz. per ton being sufficient for open-hearth steel, though with bessemer 6 to 8 oz. may be employed.

Sulphuric acid was formerly made almost entirely by the lead chamber process; though a little pyro—fuming, or Nordhausen—acid was made by the dry distillation of green vitriol. The new contact process for making sulphuric acid is in use at the German color works.

Speaking of the so-called rare elements, it has been well said that they are not so difficult to treat on account of their rarity, as that they are poorly understood on account of their complex behavior. They are rare largely on account of the rarity of suitable chemical treatment.

Aluminum is a desirable addition in steel casting because it makes it possible to use a slightly lower temperature for the pouring metal without losing a good surface to the castings. This is because the aluminum removes oxides and so indirectly increases the fluidity of the molten mixture.

The ordinary carbon filament is exceedingly delicate, being only about 0.005 in. in diameter.

The Germans in their metallurgy developed the tall stack form of furnace. The English, on the other hand, worked out the low reverberatory type. Both of these furnaces may be used, as oxidizer or reducer, according to the manipulation. Now, of course, the same plant uses either or both types as occasion may demand.

THE GEOLOGICAL SURVEY OF CANADA.

The activity in field work of the Geological Survey of Canada, always considerable, has shown a considerable increase during the past two or three years, under the direction of Dr. Robert Bell. The Survey has a wide field, including extensive regions in which there has been little or no exploration. The great northern and northwestern territories of Canada have natural resources, the development and opening of which will require years of work, which must be mainly directed by the preliminary explorations of the Survey.

During the past season thirty field parties have been out in different directions. They have worked in many districts, from the Yukon and British Columbia in the west to New Brunswick and Nova Scotia in the east, and from southern Ontario and Quebec to Lancaster sound in the Arctic regions. Their researches have had reference to coal and gold in the far east and west, and also in some of our northern and inland territories; copper in Quebec, Ontario and on the Pacific slope; iron in various localities; silver, lead, molybdenum, building and ornamental stones, graphite, mica, cement ingredients, asbestos, corundum, mineral pigments, clay products, peat, petroleum and natural gas. Much attention has also been given to surveying and exploring unknown sections; to the timber and soil of distant parts; the collection of data on mining, quarrying, artesian well-boring; also to Arctic exploration, economic botany and zoology, especially as to birds and fishes. The surveying included a number of hitherto undefined rivers and lakes and the whole of the west coast of James' bay. All the work was well planned, directed and carried out, and the results are of value to the country.

The office work of the Survey has not been neglected. During the present year, in addition to the volume of annual reports of the officers, their summary reports and numerous special publications, about twenty separate bulletins have been prepared and part of them issued, each being on some important economic mineral. The other special publications relate to a variety of scientific subjects, in regard to which the survey enjoys special advantages.

A source of gratification to Canadians has been the recent selection, as government geologist of New Zealand, of Dr. J. McIntosh Bell, who served his apprenticeship on the Canadian Survey, and whose technical work has been entirely in Canada. This adds another to the list of graduates from the Survey who are now holding important positions elsewhere.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of THE ENGINEERING AND MINING JOURNAL.

EQUIPMENT AND ORE RESERVES.

The Editor:

Sir—I have been greatly interested in following the discussion on 'Ore Reserves,' together with your impartial treatment of the subject. It is an excellent illustration of the timely fruitfulness of developing a subject in this way. Indeed I know of no greater service that the leading mining journal of the world can perform than to thresh out such puzzling questions by public discussion. Here is something practical. The faulting of the strata of the stock market may confuse many a wise and honest director or superintendent, who wishes to follow the pay-streak of honesty, and the vein of business.

Firstly, I would cordially agree with you in the wisdom of dealing frankly with the public. If ore reserves are to be hoarded, let the knowledge of the fact of reserves be as open as is the existence of the mine itself. Indeed there is no more signal mark of ethical progress, in civilization at large, and in the control of business in particular, than the growing demand by the people for a free, open statement of the respective facts. The people may not always get this, but they have learned to ask for it; and in this I presume that *vox populi* is *vox Dei.*

But secondly, assuming, to be specific, that the contrasted views of Mr. Hoover and Mr. Curle represent the opposite opinions of the speculator and of the investor respectively, is it fair to formulate the questions at issue from the standpoint of either, or, for that matter, from a standpoint intermediate between both? That is, may there not be other and more powerful considerations of business, to the demands of which the private interests of both investor and speculator must conform? It may be true, for the present—as the speculator is furnishing most of the money necessary to develop mines—that his interests must be consulted: this may be a present business necessity. But is it possible to educate the speculator to the more rational views of the investor? And is it possible, in turn, to quicken the investor with the speculator's practical keenness for results? And to do both so that business practice may attain that method of mine management which is best for all concerned in the long run?

Then, thirdly, what will best serve the real purpose of capital invested? If the application of actuary mathematics to such problems were highly developed, it would be necessary only to refer to a manual of dividend accumulation, amortization of investment, sinking fund reduction, etc., to know at once what are the financial forces that are competing for control as this complex of interests seeks its natural equilibrium.

Now a mine, even a large one, with large well-defined veins carrying a generous supply of ore, even this is not like a farm which may go on indefinitely producing from the same ground year after year. An exhausted mine is simply an empty worthless hole in the ground; and this may be the destiny of all mines. This view would seem to argue distinctly for the speculator. The mine is bound to be exhausted sooner or later: working it is like the threshing of this year's wheat crop; let it be done and done as quickly as possible, so as to release the capital for employment in other fields. The illustration is good: but it is not an argument. It is at best only an analogy which can be applied to *certain mines*, namely, those which can be quickly exhausted. As for the other class of mines, those like the Treadwell, the Homestake, or better still some imaginary reef or mountain—as the gold in the ocean, for instance—which might be practically inexhaustible, in such cases would not the policy of counting on long supplies for the long investor be the better?

This, then, is the suggestion that I would make, and I wish you would so discuss it. Is not the interest of the transient speculator, represented by Mr. Hoover, justified by the conditions of some mines? And, on the other hand, is not the interest of the long investor, represented by Mr. Curle, equally well justified by the conditions of other mines? Do not both views represent some truth—but only as applied to special cases? Will it not be well to continue the discussion till we may see clearly brought out the particular kind of mine to which applies, respectively, the interest of the investor and of the speculator?

PILGRIM.

Chicago, Dec. 5, 1904.

LEASING AT CRIPPLE CREEK.

The Editor:

Sir—There has been a considerable improvement lately in the output of the Cripple Creek district, both in quantity and quality of ore. Simultaneously there has been a decided extension of the leasing system both in practice and in popular favor. Undoubtedly a portion of the improved results are due to the success of many leases—especially on Stratton's Independence. It occurs to me that a discussion of the merits and province of the lessee as compared with the company's miner and mining engineer may interest a portion of the mining public.

Many suppose that the reason why lessees often do markedly better than companies is that they get more work out of their men and do a good deal of the work themselves. Undoubtedly in general this is true, but the importance of this point is much less than many imagine, and there is no reason why a mine superintendent cannot make his men work just as hard as a lease superintendent can. In fact, it is possible for a mine superintendent to accomplish just as good results for his company as a lessee can for himself. Many leases of importance in the Cripple Creek district are managed by hired superintendents just as mining companies are. In my opinion the superiority of the lessee comes from the fact that his training qualifies him to find ore and mine it to the best advantage. He is often aided by the fact that he has no professional record to make. He is not worried about costs per ton. His sole object is to make money and he makes it by shipping clean ore.

Nobody hears of leases in any mines except those where (1) the ore is a concentrating one, or (2) the finding of the ore is the principal part of the work. It is curious to note how little there is in mining literature on the subject of mining concentrating ores. By concentrating ore I mean an ore in which the metal sought is not uniformly distributed through the mass; in other words, an ore consisting in large part of worthless rock which must in some way be separated from the valuable mineral. Most of the mines in the Rocky Mountain region are of this character. The handling of such orebodies affords a much greater scope for intelligence and business judgment than does the extraction of a body of uniform ore. In the latter case one's efficiency can be measured in cost per ton of ore mined. In the former, one's efficiency must be measured by the cost of metals produced. It is not fair even to make a comparison of the cost of concentrates: in the case of lead ores, for example, one man may take a 50 per cent concentrate and another a 70 per cent. Obviously in a concentrating proposition the main effort is to get rid of the worthless gangue and save the valuable metal. Whether this gangue can best be removed in the process of mining, or in a concentrating mill, or partly in both, is often a question upon the solution of which depends the success of a mining venture.

In Cripple Creek the ores are almost universally of the mixed type. They will not yield to ordinary methods of water concentration. After the ore is broken it can only be separated crudely by means of screening, supplemented by hand-picking; but the concentrating can be begun at the moment the drilling begins underground by taking care to break nothing except what will pay. There is plenty of room for skill and experience in determining such questions as the following: (1) what ground to break and what to leave; (2) where to put the holes and how much powder to use in breaking in order to leave the rock in the best condition for effective sorting; (3) whether it is best to sort underground, or on the surface, or both; (4) whether to use hand-drills or machines; (5) what appliances to use in the shape of washers, sorting-tables, picking-belts, etc., etc.

Each of these questions of handling the ore may, and does, vitally affect the lessee's pocketbook. He must do his mining solely with a view to making profits, for profits he must have or quit. A mine manager may go through the motions of mining in apparently good style. He may have nice machinery, good pumps, elaborate reports, accurate cost-sheets—and no profits. He may mine large orebodies at small cost. He may point with pride to the very things that ought to condemn him as hopelessly incompetent. He may be mining too much and mining too cheap. In saving at the spigot he may be losing at the bung.

The lessee rarely commits such blunders. He thinks solely of dollars and cents. He makes no reports and seldom bothers about indicator cards, but he watches his ore like a hawk and mines it right. He ignores the frills and attacks the substance of his business.

So far so good. But the lessee's limitations are also conspicuous. Ordinarily his interest in the property does not extend beyond the hope of making some money out of a limited block of ground. His development work is apt to be done grudgingly and with little attention to its subsequent utility. In mines that have been partially developed by the leasing system it often happens that the entire mine must be re-opened on more comprehensive lines before it can be worked out. It usually happens also that the owners fall back at last upon the services of hired managers who, while having some qualifications that the lessees lack, are deficient in the very important practical virtues that the lessees possess.

It seems to me that the lessee fills a peculiar province in the mining business that is essentially his own—that of furnishing the hard

common sense and practical enterprise necessary to exploit doubtful and poorly managed mines. He has to take chances, and in taking them he is rewarded by a certain percentage of successes. He takes chances that a thoroughly competent mining engineer might not be willing to advise.

There is much that the average lessee knows which should be essential to the success of every mining operator, but which is strangely neglected by many. There are some mine managers who appear to forget that their business is *mining*, and who neglect the problem of handling the ore to spend their time on refinements which may be of importance, but which ought to be left to others. I believe it to be rare that amount of technical knowledge is of sufficient importance to cover up a deficiency in the knowledge of plain, straight mining. When the lessee demonstrates by his success that such deficiency has existed elsewhere, he is doing the business and the profession a great, but perhaps unconscious, service.

J. R. FINLAY.

Colorado Springs, Nov. 14, 1904.

CHLORINATION VS. CYANIDATION.

The Editor:

Sir—Mr. Argall's criticism (in the issue of Nov. 24) of my article on 'Chlorination in Colorado' does not by any means appear to me to establish his position. He finds fault with the cost of $2.75 to $3 per ton for chlorination, on the ground that the refunding of the investment and the "usual up-keep" were not taken into consideration. In my itemized cost will be found, "repairs, $0.25; storehouse supplies, $0.25"; making a total of $0.50 per ton. This, in the particular mill referred to, treating ordinarily 300 tons per day, means an expenditure of $55,000 yearly for supplies and repairs. If the mill were running at its normal capacity of 400 tons, this item would amount to $73,000. Now, I believe that this amount is ample to keep the mill in the very best condition. At the end of 20 years it would be fully as efficient as at the present time. It allows not only for the ordinary repairing, but the replacing of entire machines. With the exception of a few recent additions, the mill is built entirely of steel and cement; and while it will not last "forever," it certainly will last indefinitely.

It is admitted that no account was taken of the cost of these mills, nor of the cost of the general administration. Such items of expense would be irrelevant and decidedly misleading. My critic estimates the expenditure for a chlorination plant to treat 250,000 tons annually, at $9,000,000; while he puts the cost of a cyanide plant, treating 150,000 tons, at only $450,000 (or for 250,000 tons, at $700,000). It would be interesting to know wherein lies the difference. He recommends (in *The Mineral Industry*, 1898) crushing to 30-mesh and roasting, in the cyanidation of Cripple Creek ores. With a metallurgist so well informed and experienced as Mr. Argall, this is not a matter of chance. He adopted it because, after having tried everything else, he found it best. I do not know of any chlorination mill where the ore is crushed finer than 16-mesh; 12-mesh is usual and 10-mesh common. It follows, at least, that the crushing department of a cyanide mill costs considerably more than a department of equal capacity for chlorination. In the article to which I refer Mr. Argall gives the following machines as crushing from 15 to 20-mesh (suitable for chlorination) to 30 and 40-mesh (suitable for cyanidation): "Mill No. 1 has one 27-in. and three 26-in. crushing rolls, with a capacity of 100 tons per day to 40-mesh. Mill No. 2 has one 36-in. and three 26 by 15 in. rolls; its capacity is 170 tons per day to 30-mesh. Mill No. 3 is similarly equipped with a capacity of 200 tons to 30-mesh." This makes 12 sets of rolls, with their accompanying screens and elevators, more than would be required in a chlorination plant of the same capacity. The power alone required for this machinery would not be less than 150 h.p. per hour—a factor which demands recognition.

My experience in roasting indicates decidedly that ore crushed to 30-mesh is more difficult to roast than ore crushed to 12-mesh. Moreover, the dust is a serious problem, not only in the actual roasting, but also in the loss and the subsequent treatment of the portion recovered. Cyanidation, therefore, offers no advantages in roasting. Mr. Argall figures that the chlorination department of a chlorination mill costs more than the leaching department of a cyanide mill. However, admitting this, I believe that it is fully offset by the extra expense in the crushing required by cyanidation.

Again, Mr. Argall allows 10 per cent interest for the money invested in a mill composed entirely of steel, stone, cement and asbestos, and only 6 per cent on the other mills, all of which are wooden structures. What is the use of introducing such items when they differ so largely? It is admitted that they cannot be ignored. Mr. Argall takes exceptions to my statement that "one of the largest chlorination mills was built by capitalists who previously employed both processes side by side in an earlier mill." I have no means of ascertaining whether either process was a success. Suppose both were failures. The natural inference is "Between two difficulties, choose the least." I cannot imagine that the shrewd capitalists who were connected with the enterprise should choose the more costly process.

My critic states that a modern cyanide mill of 150,000 tons yearly capacity could treat sulpho-telluride ores for $2.20 per ton. The information I have on the roasting and cyaniding of Cripple Creek ore indicates that the cost is a little over $3 per ton. Certainly up to the actual chemical treatment the advantages are entirely with the chlorination process. In my estimate of cost of chemicals in the chlorination process, average conditions were assumed. If the ore is favorable and advantage is taken of the market and large contracts, this cost would be materially reduced. That the cyanide costs less per ton than the chlorine generated from chemicals is admitted, but with the application of electrolytic chlorine even this difference vanishes.

Mr. Argall says, "It is difficult to conceive how it is possible to agitate a 10-ton charge in an expensive lead-lined barrel using 85c. worth of chemicals per ton as cheaply as, say, a 100-ton charge can be treated—without agitation." It takes five minutes to automatically charge the ore, 20 minutes to completely charge the barrel, and eight minutes to empty it. The barrel revolves three hours per charge, and consumes about 8 h.p. per hour, or 24 h.p. Estimating coal at $2 and 5 lb. per h.p., it would cost 1.2c. per ton to agitate. How much cheaper can the ore be trammed or conveyed into a vat, the solution pumped back for several days, and the vat again emptied?

"By chlorinating, I mean the whole combination process as it has been developed, barrel chlorination, concentrating, cyaniding the tailing (another expense overlooked by Mr. Greenawalt), and in some cases a second concentration." Mr. Argall, in making this statement, gives the impression that the Cripple Creek chlorination tailing is regularly cyanided, and in some cases given a second concentration. I do not know of a single mill in Colorado where the current tailing is cyanided or twice concentrated. Recently the United States Reduction & Refining Company erected a small cyanide plant to treat the tailing from the old Colorado-Philadelphia mill. This tailing is concentrated after cyanidation. This is the only second concentration that I know of. In the earlier chlorination mills, concentration was not comprised in the scheme of treatment, and even some of the present mills do not concentrate the barrel tailing.

WILLIAM E. GREENAWALT.

Denver, Nov. 30, 1904.

CORUNDUM IN POTTERY.—It is suggested that corundum will make a serviceable material in ceramics, in view of its strength, resistance to heat, freedom from checking, and other similar desirable properties. In this connection it is proposed to use also the artificial alumina obtained as the by-product slag from the thermit process. These suggestions are made in the *Chemical Trade Journal* of recent date.

KUNZITE.—Kunzite, a variety of spodumene, found in California, is now cut and sold as a gem in sizes weighing from 1 to 150 carats. In color there is a variation from almost white with a faint pink tone, through pink and lilac pink, into dark lilac. The gem is remarkably brilliant, no matter what the color. It is usually perfect and free from flaws, and, when pink, is one of the few natural stones of that color. The price has varied from $6 to $20 per carat, although generally it averages one-third the latter figure.

COPPERAS AS A FERTILIZER.—Experiments made by E. Leclercq (*Bulletin* Cercle Etudes Agronomiques, Brussels, 1903) have proved that 250 kg. of copperas will produce as great an effect on oats as 150 kg. of nitrate of soda. An additional benefit is the destruction of weeds by the copperas. The experimenter claims that the fertilizer value of the copperas is in the iron, not in the sulphuric acid. Considering that nitrate of soda sells at five times the price of copperas, there would be a material saving to agriculturists.

AMBER.—The Prussian Government collects over $380,000 annually as revenue from the amber mines at Palmnicken. From 1803 to 1811 the industry had to receive a subsidy from the government; now it is self-supporting. In the 20 years from 1883 to 1902 the Palmnicken mines produced 8,457 metric tons of amber, the record being established in the last three years.

The value of amber used in America last year was $210,709, making it the second largest consumer in the world. Besides smoking materials, ornamental beads and other articles are made from imported amber.

RE-GRINDING AT EL ORO.*

BY CHARLES BUTTERS AND E. M. HAMILTON.

It is well known that, while former practice in stamping and grinding avoided the production of much slime, the modern tendency is to reduce the ore as fine as possible, with better extraction under suitable treatment. The authors give the results of an exhaustive examination of—(1) the best method for producing a fine product; (2) the desirable rate of feed in re-grinding; (3) the fineness of products needing re-grinding; (4) the results of leaching each grade of fineness; (5) the effect of oxidation by air agitation, and by chemicals.

The extent of the losses, due to coarseness and other causes, was estimated at $1,100 per day on a 300-ton stamp service; or $33,000 per month.

The machine which affords the best conditions for fine grinding is the tubular flint mill; it is likely that much will be heard from this machine in the near future.

The 'sand' and the 'slime' were examined separately. The résumé of the sand experiments is as follows:

1. Of different rates of feed for the tube-mill—1, 1½, 2 and 3 tons per hour—the last showed the best profit.

2. Grinding at this rate can be done for 53c. gold per ton of sand.

3. The grade of sand to be re-ground includes all not passing a 200-mesh screen (this amounts to 51 per cent of the mortar-box product, using a 35-mesh screen).

4. Such re-grinding makes about 50 per cent of the total battery ore suitable for the agitation treatment. The rest leaches freely if thoroughly separated.

5. Such re-grinding gives an extra recovery of $4.02 per ton of sand, with a net profit of $3.49 on the grade of ore mined at present.

6. If 50 per cent of the entire stamp product be re-ground, it results in an extra recovery of $2.01 per ton, and a net profit of $1.74 per ton.

The ore treated at the stamps carries about $14 in gold per ton, and about 4.75 oz. of silver. The gradual increase of extraction with increasingly fine grinding "points to the theory that, if the whole could be reduced to an absolutely amorphous and impalpable powder, there would be nothing to hinder a total extraction of the value." Practically it was not possible to work up to this ideal limit.

Special tests on the slime indicate that the use of mercuric chloride about offsets the extra cost and time of air agitation, and gives $0.25 better extraction. This applies especially to the condition and recovery of the silver value. Permanganate experiments partly confirmed the theory of a lack of oxygen, but also indicated some other unknown reason to account for the bad extraction of silver.

Roasting favorably affected the silver extraction, but not that of the gold; this effect appeared chiefly in the slime, but only to a slight extent in the sand.

While the sand treatment is comparatively simple in showing the efficacy of fine subdivision, the problem of extracting the slime is more complex, especially as regards the silver; there still remain several points for investigation.

The ore treated averaged about $14 in gold and $2.35 in silver, estimating silver at $0.50 per ounce. Among the items of grinding expense, the cost per ton of power, pebbles, liners, depreciation, etc., is summed up as follows:

	Rate of Grinding.		
	1.5 tons per hour.	2 tons per hour.	3 tons per hour.
Power per ton	$0.36	$0.27	$0.18
Repairs (liners, pebbles, etc.)	0.63	0.48	0.31
Depreciation	0.08	0.06	0.04
Total	$1.07	$0.81	$0.53

The difference in cost of treatment between the 2-ton per hour feed and the 1.5-ton feed is $0.26; but the gain in extraction was only $0.18—a net loss of 8c. per ton.

This is only one illustration of the richness and variety of detail afforded, and for which reference must be made to the original paper.

In a subsequent discussion[1] on this paper Mr. S. H. Pearce said that having returned recently from a visit to El Oro mine himself he was able to confirm the view taken as to the necessity for re-grinding of the sand, in order profitably to obtain higher extractions. The assay value of the sand remaining on the 40-mesh, after treatment with aqua regia, is found to be—gold, $5.79, and silver, 3.3 oz.; even the sand passing 150-mesh carried over $2 insoluble gold. Practically none of the silver is recovered by amalgamation, whereas the mill bullion, obtained while he was there, carried nearly as much silver as gold. In regard to the slime treatment, he agreed with Mr. Butters on the matter of dilution of charges and prolonged contact, etc.; it is difficult to compare that mineral with another on account of the silver content, which forms a study in itself; the ore is such that the question of a complete classification of sand and slime is of great importance, and the ordinary equipment of spitzkasten is not sufficiently effective. He had no doubt that the adoption of a cone system, similar to the one in use at the Homestake mine, would make a material difference in the results from the slime. As regards the comparison of air and mechanical agitation, his own results showed more gold, but less silver, obtained by the latter. But when small differences obtained in experiment are multiplied by big tonnage they are apt to convey erroneous impressions that might not be borne out in practice. The points worthy of consideration are: (1) To what extent is re-grinding of gold ores beneficial when represented by such different classes as (a) the ore under consideration, where the value is locked up in the quartz, and (b) the Rand conglomerate, where the gold exists in the pyritic portion only? (2) Whether the tube-mill is the best machine for that purpose. (3) The ratio of duty that should be borne by the stamp-battery and tube-mill, respectively. (4) The presenting of data as to costs, the life of liners, and other details. He did not personally consider the wear of the pebbles and the life of the liners to be borne out by Rand experience—and, if he might say so, he was like the author's cheery self, Mr. Butters, rather too optimistic.

Mr. Walter McDermott said that in the matter of the grading of ores, it was shown that the sizes of mesh did not represent necessarily the mechanical condition of the various grades of ore which had to be treated. Mr. Butters had proved that in the first crushing from the stamp-batteries, the slime, containing the clayey portion of the ore, is naturally of a different character from the re-crushed granular portion from the tube-mill after passing the same size of screen; so different was it that in one case material which had been re-ground to pass a 200-mesh was so granular in character that 80 per cent of it would leach freely to a depth of five or six feet, showing that the ordinary definition of slime from direct stamping as being below 150 or 200-mesh represents something quite different in the two cases. The papers were most valuable as bringing out the fact that on different ores the same screen-grades of material do not represent the same sizes of particles when the system of crushing is the same, and that with any variation in the system of crushing the grades will also vary in character, and so involve variations in the method of treatment.

Mr. H. Livingstone Sulman remarked that he would re-echo the want of a definition for 'slime.' To him slime meant fine ore-material which is not percolable by extraction solutions. They could not hope to define slime on any system dependent upon the average mesh or the size of the particle. If one took quartz and ground it to 200-mesh, or even below, and then sized the product on various successive sieves a few tens of meshes per linear inch apart, each of these sifted products would be found to be readily and almost equally percolable. This was no news to those who remembered Mr. Charles Butters' endeavors to treat Rand slime by spitzkasten grading. Even the fine gradings are separately more or less readily leachable, but when all are re-mixed the product again becomes practically impermeable. 'Slime,' therefore, is due not so much to any limit in particle size, as to want of approximate uniformity in size; in other words, its impermeability is the consequence of lack of even approximate uniformity of interstice.

It was, also, of peculiar interest to notice the strides that had been made of late in applying vacuum filtration to slime. Several systems had been brought forward; probably the best known at present was the Moore plant at Mercur, although the Argo apparatus had been tried in South Africa, and he believed that Mr. Butters, at San Salvador, had been successfully using a modification of the Moore filter. They must also remember that the tube-mill was not the discovery of the Rand, and that the excellent work accomplished of late by Mr. Caldecott and Mr. Denny in South Africa and Messrs. Butters and Hamilton in America was probably the direct result of what Dr. Diehl and his colleagues had been doing in Western Australia for the last six years. He might mention that, so far as he could trace, the tube-mills at present actually employed in the fine crushing of gold ores probably did not much exceed 40 in number.

Mr. Gruessner said that with regard to the cost of grinding, he had obtained some figures from Mr. Guenther, the engineer of the London & Hamburg Gold Recovery Company. The first figures available were those from the Hannan's Star Gold Mining Company, W. A., which crushes the ore in two No. 5 dry ball-mills and afterward in one wet grit-mill 16 ft. long and 4 ft. diam., the former having a capacity of 78 tons, of which 48.7 per cent, equal to 38 tons, is ground in the wet grit-mill to about 250-mesh. The pulp fed into the mill contains: Coarser than 40-mesh, 20.5 per cent; 40 to 60-mesh, 43.8 per cent; 60 to 100-mesh, 28.1 per cent; 100 to 150-mesh, 7.6 per cent. The whole product from the delivery end of the mill is returned by an elevator to the spitz-

*Abstract of a paper 'On the Cyaniding of Ore at El Oro, Mexico, Dealing Principally with Re-grinding of Sands.' The Institution of Mining and Metallurgy, London, October 20, 1904.

[1] Institution of Mining and Metallurgy. October 20, 1904. Abstracted.

kasten and re-classified, the sand returning in the underflow to be re-ground in the grit-mill, whereas the overflow passes on to the next stage in the process, the latter containing: Coarser than 100-mesh, 0.7 per cent; 100 to 150-mesh, 4 per cent; finer than 150-mesh, 95.3 per cent. The power consumption of this 16-ft. mill amounts to 30 horse-power. The working costs per ton of crude ore for pulping the sand from the dry ball-mill are as follows: Power, 11.53d.; flints and liners, 1.85d.; labor, 3.50d.; repairs, 0.99d.; total, 1s. 5.87d. per ton. The size of the mill is 3 ft. 11 in. by 16 ft. 5 in., with liners, of hard iron at first, and later on of Krupp's manganese steel. These figures compare very well with those which he obtained from Mr. Nicholson, the manager of the Ivanhoe. At this mine the fine grinding of sand costs 1s. 6d. per ton. Of course the circumstances in Kalgoorlie are not so favorable as in South Africa, where the power is cheaper. He thought the figure for power in Kalgoorlie was about 2s. per horse-power per 24 hours. Under ordinary circumstances the grinding would be somewhat cheaper. In regard to the liners, they are not chilled iron—most people speak of chilled iron—but so-called hard iron, a homogeneous iron; because if chilled iron is used the chilled surface lasts for perhaps four or five months, and then the softer part of the plate wears down in a few weeks. Therefore, they use very hard iron, so that the consumption of the iron from wear and tear, or the wear of the plates, is about nine months, as he found out at Hannan's Star, and some other mines, the Golden Horseshoe, for instance.

Mr. Alfred James said, with regard to liners, that the chilled iron liners last from seven to ten months; but manganese steel liners, which had been sent out more recently, had lasted for 15 months. With regard to flints, and also the hardness of ore, the wear of flints on the Rand at the time of his visit was about 1 lb., or rather less than 1 lb., per ton crushed, which is almost identical with the figures from Western Australia. The reason those liners wore out was because they had been crushing such coarse material in their trials. It was the 8-mesh feed which wore out the liners, not bad handling.

Mr. Walter Broadbridge said that as a comparison of El Oro and Kalgoorlie costs would be instructive, he had reduced them to the same footing. This shows a considerable difference in favor of West Australian practice, and serves to emphasize the point raised above. For the purpose of discussion, the costs of fine-grinding sand at the Oroya Brownhill and Lake View Consols mines are taken. The Oroya Brownhill has the most up-to-date reduction plant at Kalgoorlie. The Lake View Consols was under the disadvantage of having a plant which is at present being remodeled. The comparative costs, allowing the same figure for depreciation as Mr. Butters, would be as follows:

	s.	d.	
Oroya Brownhill	0	9.16	per ton treated.
Lake View Consols	1	1.79	" " "
El Oro	3	4.5	" " "

The No. 5 Krupp mill is capable of grinding 7.5 tons of sand per hour, with a load of 12 tons of flint. Kalgoorlie experience shows that the best load for the No. 2 mills is between 35 and 45 tons per 24 hours, the average working cost being 1s. 10d. per ton.

The cost of crushing, treating, re-grinding, and re-cyaniding at the Oroya, he estimated at about 10s. per ton.

THE CALIFORNIA MINERS' ASSOCIATION.

BY OUR SPECIAL CORRESPONDENT.

The annual convention of the California Miners' Association has been in session in this city for the first three days of this week, and one day's work still remains at the date of writing, December 7. There has been a conference of prominent members of the association, at which it was decided to continue the organization, but on a new basis. The principal feature of the new arrangement is to do away entirely with the branch county associations. When the association was first organized, it was thought necessary to have a branch in each of the mining counties of the State. Each branch had its separate organization and officers, and it was supposed that these branches would bring to the attention of the parent organization any matters of special interest to the respective counties. Moreover, each county branch was supposed to collect regular dues from its members and forward 75 per cent of the sum collected to the main association. Each county association had the right to appoint one delegate for each 10 members, to the annual convention. This worked reasonably well for a few years, but finally it became apparent that the plan was a failure. Interest in the county organizations fell off, when matters of no direct interest appealed to them, and as a result there was a failure to hold meetings, to collect dues, or to communicate directly with the officers of the main association.

This being the case, most of the expenses had to be defrayed from contributions obtained in the city of San Francisco. Now a new constitution has been adopted by the association, by which all official county branches are abolished, but provision is made that any county association of miners shall be entitled to representation at the annual convention, provided it pay into the treasury of the association $5 for each representative that it may claim, the proportion being one representative for each five members.

In this connection, however, provision is made that each delegate appointed from any independent miners' association must have been an elective member of the California Miners' Association.

It is no longer possible, moreover, for every one to pay merely $1 a year to be a member of this association. Under the new constitution, a duly appointed election committee must pass upon the name of any candidate for membership, and each member, aside from firms or corporations, must pay annual dues of $5. The dues for mining companies are $25 per annum; mercantile or manufacturing firms or corporations in San Francisco or Los Angeles directly interested in mining industry, $50; mercantile or manufacturing firms or corporations in San Francisco or Los Angeles friendly to, but not directly interested in, the mining industry, $25; mercantile firms or corporations outside of the city of San Francisco or Los Angeles, directly or indirectly interested in the mining industry, $25 per annum.

Another feature of the new constitution is that any member of the association in good standing is entitled to vote at all meetings of the association, and need not be a selected delegate. A provision is made that each mercantile firm or corporation is entitled to a representative, with power to vote at all meetings. Some minor changes are made in the constitution and by-laws, but these are the principal ones. It is now thought that the association can be properly maintained without the aid of separate branch county associations, which have proved to be a failure so far as financial support is concerned. It is the intention to obtain as members as many of the mining superintendents and mine-owners throughout the State as possible. Working miners can also become members if they care to, but small support has heretofore been received from this latter class.

At the time of writing this letter the committee on resolutions has not reported, so that consideration of these matters must be left for a future letter.

TRIAL OF FEEDERS.—At the Crown Reef mine on the Rand, in South Africa, the Challenge feeder, on part of a mill, showed an average duty of 5.9 tons per stamp per 24 hours. The Hunter feeder, on the rest of the same mill, gave 6.61 tons. The test covered nearly a month and the screen used at the stamps was a 26 mesh.

MOLYBDENUM STEEL.—There are two kinds of this alloy, depending on the ratio of the molybdenum to the carbon. The effect of molybdenum, even in small quantity, is to increase the breaking stress without making the metal brittle. In general, the effect of molybdenum on steel is similar to that of tungsten; but a relatively smaller amount of the former metal is needed to produce approximately the same result.

RUSSIAN DEMAND FOR PYRITE.—The enormous consumption of sulphuric acid, especially in the refining of petroleum, and the high cost of brimstone, of which imports from Sicily this year will be about 16,000 or 17,000 tons, have opened a promising market for iron pyrite in Russia. The Ural pyrite, as well as that from the Caucasus, is insufficient to meet the demand, which from Poland alone is estimated at 40,000 tons per annum. At present most imports are made through a German concern, which is the selling agency for a British company interested in mines in Spain and Portugal. This monopoly, for it is nothing else, has initiated competition from the pyrite mines in Westphalia and Hungary, with the result that quantities have been introduced into Russia. These outside mines are enlarging their producing capacity, and in the near future will receive a substantial share of the Russian trade.

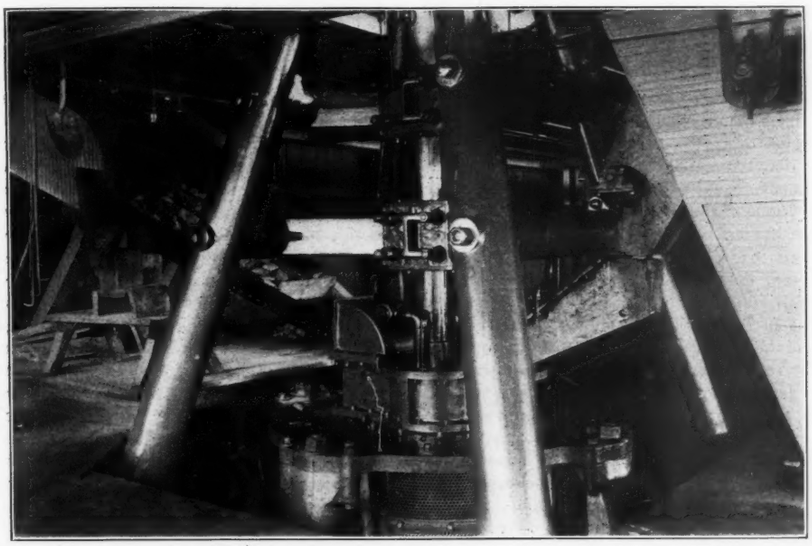
AN ATMOSPHERE OF OXYGEN.—The query is sometimes made: What would happen on the globe if all nitrogen were to be removed from the air? One is liable at first glance to infer that if only oxygen were left it would act like the pure gas of the chemical lecture desk, even burning up the iron of the furnace. But this notion is erroneous. One should reflect that there would be no more, and no less, oxygen in a given volume of air, because the oxygen and the nitrogen stands, each under its own "partial pressure." Hence, as there would not be any more oxygen in a given volume, it could not be any more active than at present. But another result would occur; the partial pressure of the nitrogen being removed, men, animals, and plants would all bleed to death. It would be much as though one were suddenly removed to a high altitude, where hemorrhage occurs from the diminished external pressure. This would be the chief result of the sudden removal of the nitrogen from the air.

COPPER MINES OF LAKE SUPERIOR.—X.

By T. A. RICKARD.

The thunder of the ordinary stamp-mill may be likened to the rhythmic crash of the surf; at a distance, especially among mountains encouraging an echo, the muffled roar of many stamps is as the voice of the sea when heard from far inland. But the steam-stamp has no poetry; it is all practical. It seemed to me, while in the Lake Superior copper region, that whether a mill contained one stamp or twenty, it was only a single elephantine thump that I heard. Inside also there was not the confusing uproar which accompanies the work of gravity stamps when under cover, but the decisive thuds of one or more heads sending their tons of weight into the bed of ore on the dies. In Gilpin county, Colorado, a mill that crushes 500 tons per diem would contain three or four hundred stamps, while a California mill with equal capacity would require about two hundred, and, similarly, a South African plant treating 500 tons would have 100 stamps; therefore, to the visitor from other mining regions, a mill of one stamp appears a lonesome piece of machinery, until it is realized that it crushes a tonnage equal to the output of a whole row of batteries of the ordinary type. The Isle Royale mill, the first one I visited, because it is close to the town of Houghton, had only one stamp in operation, yet it crushed 550 tons per diem, and the contrast with earlier experiences was rendered vivid.

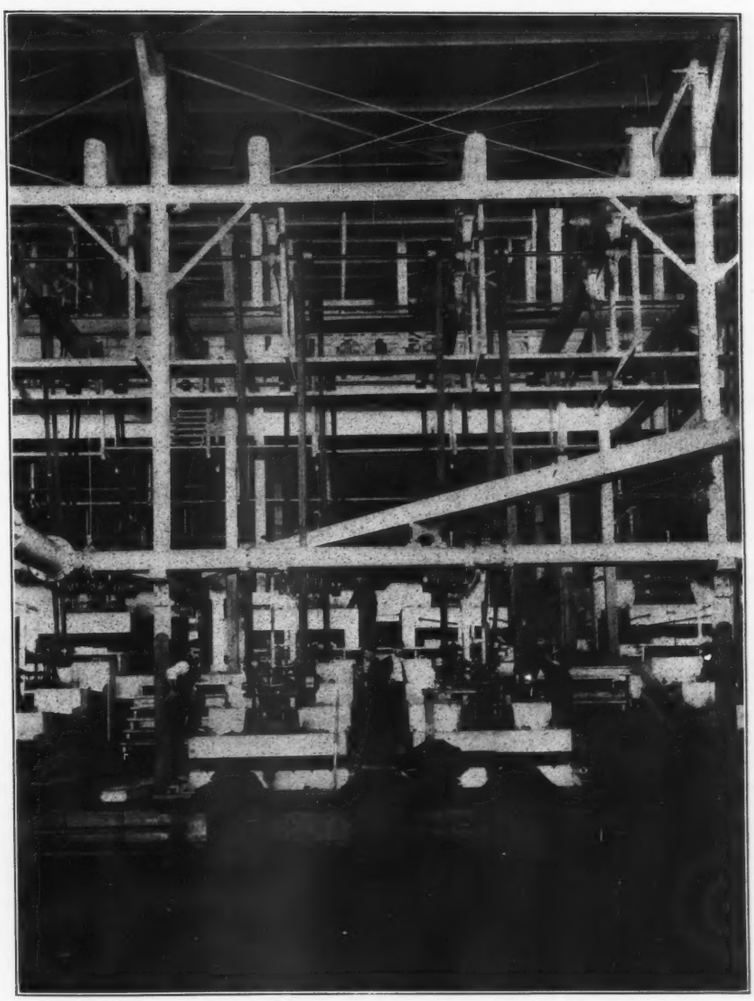
There is less noise; there is also less vibration; and, by reason of the absence of long belts from shaft to counter-shaft, there is more room, which is utilized to the extent of employing the feed-floor as a machine shop. At the very beginning of the milling, and thence to the end of the operation, the object of the reduction process is in plain sight. With a gold ore of average grade one does not see the metal; it is extracted when still alloyed with mercury as an amalgam, or as a concentrate intimately associated with bright sulphides, or as an unseen element in black slime. But in this treatment of copper rock the metal stands out everywhere—it is picked in big chunks out of the broken stuff running from the bin into the mortar; it is discharged in lumps as big as potatoes from the mortar itself; it is taken as a red gravel from the roughing jigs; it comes in finer grains from the finishing jigs, and as a red mud from the Wilfleys. Throughout the series of operations, the object of all the expenditure of machine power and human labor is plainly visible. Finally, it is collected, not in the relatively insignificant proportion in which gold is obtained, but lavishly, to be loaded into oil-barrels, of 52 gal. capacity; each of these contains 1,500 to 1,800 lb., and when ready for shipment, they are sent on railroad cars, to the smelter.



STEAM-STAMP AS SEEN AT FEEDING FLOOR.

While at the Tamarack mine I saw a train of eleven cars, carrying 440 tons of mine ore, about to start for the mill. This entire trainload of copper rock was insufficient to keep one stamp going for one day. Twenty-five years ago the maximum capacity of a steam stamp was 150 tons of amygaloid; seven years ago it was 350 tons per stamp; now the new compound stamp has a one-day record of 779 tons, and a two weeks' record of 725 tons per 24 hours of actual running, or a duty of 700 tons per day, including stops. This has been done recently at the Osceola mill on Kearsarge amygdaloid.

To convey the product of this powerful crushing machine an enormous volume of water is required. The average consumption is 3½ million gallons per head per 24 hours. At the Quincy mill an Allis triple-expansion pumping engine throws 16,000,000 gal. and a Worthington pump 12,000,000; this supply of 28,000,000 gal. is consumed by the eight stamps, of which seven are usually at work. There is an overflow of 3,500,000 gal., or sufficient for another stamp—which includes, of course, the array of jigs and tables which represent



INTERIOR OF TRIMOUNTAIN MILL.

the scheme of treatment. In an ordinary stamp-mill the water used averages 3 to 5 gal. per stamp per minute, or about 10 tons of water per ton of ore. In these steam-stamp works the ratio is 30 tons of water to one ton of rock crushed.

The process consists of coarse crushing—through screen openings of ⅝ inch—followed by successful elimination of the copper by jigs and concentrating tables, aided by the usual classifiers. A small part of the material undergoes re-grinding. It is a process of elimination of a single product—native copper—by gradual concentration, the crude material being to the final product in the ratio of about 60 to 1. A Montana mill treating mixed sulphides would be nearly four times as big.

The steam-stamp was invented by Ball, a Connecticut engineer, who had built steam-hammers, and saw their availability for crushing ore; the steam-stamp may also be regarded as a gravity stamp of great weight actuated directly by a steam-engine, the stem becoming the extension of the piston. In the Leavitt design, in which the steam is admitted only at the top of the cylinder, the stamp-shaft, with its attached shoe, on striking the bed of ore, rebounds against the condensing cushion of steam so that the uneven surface of ore on the die suffices to turn the stamp. But this turning is quite irregular; it is scarcely appreciable for two or three successive drops, and then comes a grand whirl equal to half a revolution. In the Allis and Nordberg stamps, the steam is admitted to the cylinder both at the top and bottom; the steam admitted through the upper ports drives the stamp-shaft down into the bed of ore upon the die, the stamp being immediately raised at the end of the stroke by the admission of steam through the lower ports of the cylinder. By reason of the force with which the shoe is driven into the ore, a mechanical device is required to turn the stamp.

On the whole, while the steam-stamp is an impressive rock-breaker, it is a bad pulverizer and an expensive kind of engine, for it uses 45 to 60 lb. steam per horsepower-hour. Greater economy has been secured by the introduction of the compound system. In the Osceola and Champion mills, the use of compound engines on the stamps has met with excellent results and has enabled the attainment of a maximum crushing capacity—710 tons per head.

The rock contains lump copper, which the stamp of course fails to crush, and only serves to deform; this is extracted by two devices, both of which are described in the notes which follow. These lumps of metal, like potatoes in size, used to be a serious obstacle. Before the automatic discharges were invented, it was necessary to stop three or four times in a shift, and raise the stamp on blocks, while prying out the chunks of metallic copper with picks and crowbars.

A look at the ragged, irregular pieces of copper, with their attached rock-matrix, as they appear before going under the stamp, and the examination of the rounded nuggets as discharged from the mortar, after being pounded under the stamp, will enable one to realize the waste of power and the abrasion of metal which must take place before the milling operations are properly started.

The mortar screen is made in sections; at the Quincy mill, out of five such sections, one of the central two has 1-inch openings while the others have ⅝ inch; it having been found that this arrangement relieves the mortar of nugget copper, which is unable to make its exit through the hydraulic (Krause) discharge. The mortar is also provided with a hinged screen which enables it to be opened for examination and closed again within five minutes. Formerly this required at least one-quarter of an hour. It is customary to open the mortar twice per shift, and oftener when anything goes wrong.

Difference of character in the copper rock affects the crushing of it and leads to a modification of treatment. Amygdaloid is not only easier to crush than conglomerate, but the copper does not enter so much into the harder portions of the rock as in conglomerate, where the hardest pebbles are intimately impregnated with the metal, and, therefore, require finer comminution. The later takes the form of re-grinding. This is to-day one of the principal problems of the milling practice, but it will be considered to better advantage when the representative mills have been described.

The Isle Royale is a comparatively new mill of three stamps, designed on lines which represent the outcome of the practice prevailing four years ago. Ore from the mines comes in hopper-bottom cars of 30-ton capacity. Sixteen to 20 of them arrive at the mill every 24 hours, to supply the single stamp now in operation. The capacity of each stamp is 550 tons per diem. From the bin the ore is fed by gravity along an iron chute, kept wet by a stream of water, so as to aid the descent of the material and wash down the fine stuff. A man with an iron rod, hooked at the end, watches the feed and regulates it, by holding back the ore on the chute or expediting it, as required by the stamp, the needs of which are indicated by the striking of a 'bonnet' or coupling upon an iron rod whenever the feed is too low.

The stamp is driven in its descent by the piston of a steam-engine having a 20-in. cylinder and rated at 190 horsepower. Steam follows the stamp for about half the stroke, the head developing a maximum velocity of 25 ft. per second. The total falling weight is three to four tons. Each shoe weighs 800 lb. when new, and lasts about two weeks, by which time it has lost half its weight. Both shoes and dies are of chilled iron, made at the local foundry. The stamp drops 108 times per minute, a stroke or drop of 24 in. and an actual average stroke of 20 to 24 in., the difference being due to the thickness of the bed of ore on the die.

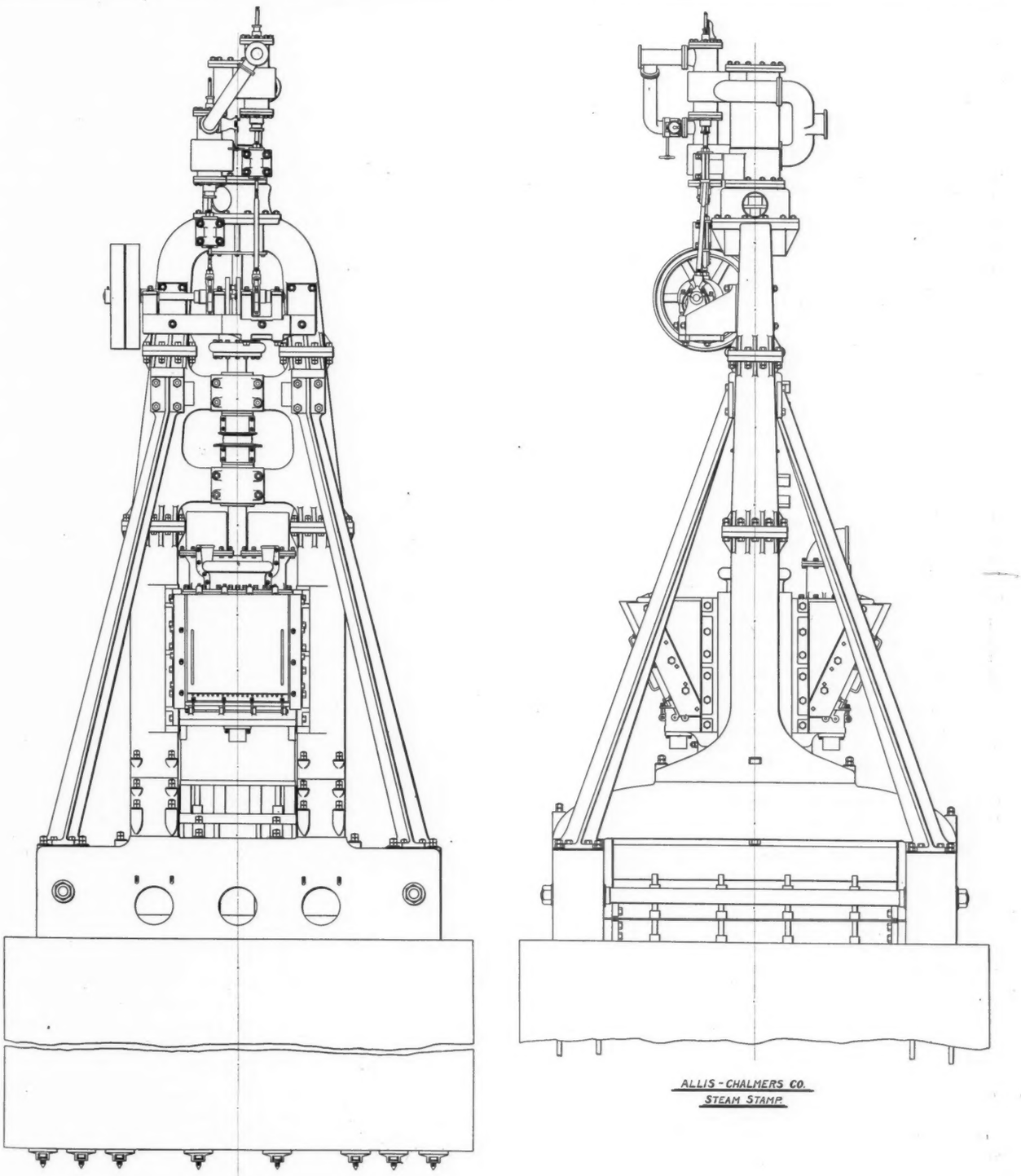
The mortar is circular and has a sectional lining which is renewed every 1½ to 2 years. Discharge takes place through a screen of punched steel-plate with holes ⅝ in. diameter. After passing through this screen, the pulp goes to two trommels, having ¼-in. holes, the oversize from which is returned (at the rate of about 7 tons per hour) to the mortar by means of a rubber belt-elevator. Removal of lump copper from the mortar is effected by a hydraulic arrangement known as the Parnall-Krause discharge. This device consists essentially of a stream of water rising through a 6-in. pipe, and entering the mortar through a 4-in. opening just below the lip of the latter. The rising stream is under pressure sufficient to keep the rock from getting out of the mortar, while permitting the exit of the copper. The pieces of metal thus extracted are termed 'headings.' About one-quarter of the total product of the mill comes out in this way; an equal proportion of the remaining copper is extracted between the mortar and the trommels by a similar hydraulic separation acting through an inch pipe.

The scheme of treatment is indicated on the accompanying diagram, which illustrates one-half of a symmetric arrangement. The undersize from the trommels goes to a Tamarack hydraulic classifier, or spitzlutte, having four partitions. Four sizes are made; these go to a respective series of roughing jigs, of which there are six rows of four each. They are double compartment Collom jigs. Each yields a product of metallic copper; the overflow goes to waste, while the hutchwork passes on to the distributors which feed the finishing jigs; of these there are 12, with double compartments. Here the product is again copper metal; the hutchwork goes to settling boxes; a portion is clean enough to go to the smelter; the remainder is re-treated; the overflow goes to the lake. Concerning the roughing jigs, it may be added that the first of these has an 8-mesh sieve followed by a 10-mesh in the adjoining compartment; the next has 12 and 14-mesh, respectively; the third 10 and 12, the fourth 14 and 16. In each case the screen is cut to a sieve 24 in. wide by 36 in. long. Returning to the classifier below the trommels: the slime proceeds to V-shaped settling boxes and is there separated, the overflow discharging into the lake, while the heavy goes to three revolving two-deck buddles known as Evans tables, the product of which is re-dressed on a Wilfley table, the tailing from this machine being returned to the Evans slime-tables. The Evans buddles have a cement surface and their capacity is 12½ tons per deck or 25 tons for the machine.

The 'ragging' from the second compartment of the roughing jigs is withdrawn through an air discharge and goes back to the stamp. This 'ragging' is the heavy copper-bearing sand lying immediately over the copper which concentrates on the sieve; it is essentially a coarse middling. The treatment of this material was the only attempt at re-grinding in the Isle Royale mill at the time of my visit, but I am informed by the superintendent, Mr. J. G. Glanville, that rolls are now being installed to treat oversize from the revolving screens.

Another typical stamp-mill crushing amygdaloid copper-rock is that of the Quincy, on Torch lake. Mr. Jas. W. Shields is superintendent. There are two mills, one containing five heads and the other three. In the old mill each stamp has a crushing capacity of 475 tons, under a steam-pressure of 98 lb. per sq. in., while in the adjoining new mill a capacity of 550 tons is obtained with a pressure of 118 lb. of steam. New shoes weigh 708 lb. and last eight days, by which time they weigh 435 lb. The die weighs 800 lb. and lasts six to eight months; when taken out it weighs 225 to 275 lb. if it has worn evenly, the average being 250 pounds.

The stamps have an improved discharge for removing lump copper from the mortar, and there is a similar hydraulic separator below each of the trommels, to which the crushed rock passes from the stamp. The screen on the mortar is made in five upright sections or strips, one of them having openings of 1 inch and the others holes of ⅝ inch. The larger screen-opening is found to be successful in relieving the mortar of lump copper which does not make an exit by the mortar discharge. From the stamp the ore goes to the two trommels, provided with screens having ¼-



in. holes. In each mill the trommels are followed by classifiers and 24 roughing jigs, followed by more classifiers, the oversize going to six finishing jigs and the remainder to two Wilfley tables. In the old mill the slime, forming the overflow from the first classifier, goes to four settling boxes, or 'slime tanks,' and thence to six Wilfley tables. In the new mill there are six Wilfley tables and one Standard table for treating the slime to each stamp, the head and middling from the set of six Wilfleys being pumped into a settling box, the overflow going to the waste launder and the remainder to the Standard table, whence the tailing goes back to the 'slime tank' feeding the six Wilfleys, while the heading makes a copper product. The only re-grinding is done by a Chilean mill, of the Monadnock type, which crushes 60 tons per 24 hours, the material treated being the coarse middling from the last two series of roughing jigs, which, after passing through a 10-mesh sieve, is treated on jigs and Wilfley tables.

The Isle Royale mill represents the prevailing practice in the treatment of amygdaloid ores; that of the Calumet & Hecla, now to be described briefly, is representative of the accepted method of milling the copper-bearing conglomerate. The big plant of the Calumet & Hecla is situated on Torch lake, about five miles from the mines; it consists of two adjoining mill-buildings, both of them impressive on account of their size. As you walk through them the amount of machinery seems unending, for one mill, containing 17 stamps, is 700 ft. and the other, with 11 heads, is 400 ft. wide, the length along the line of treatment being 175 feet.

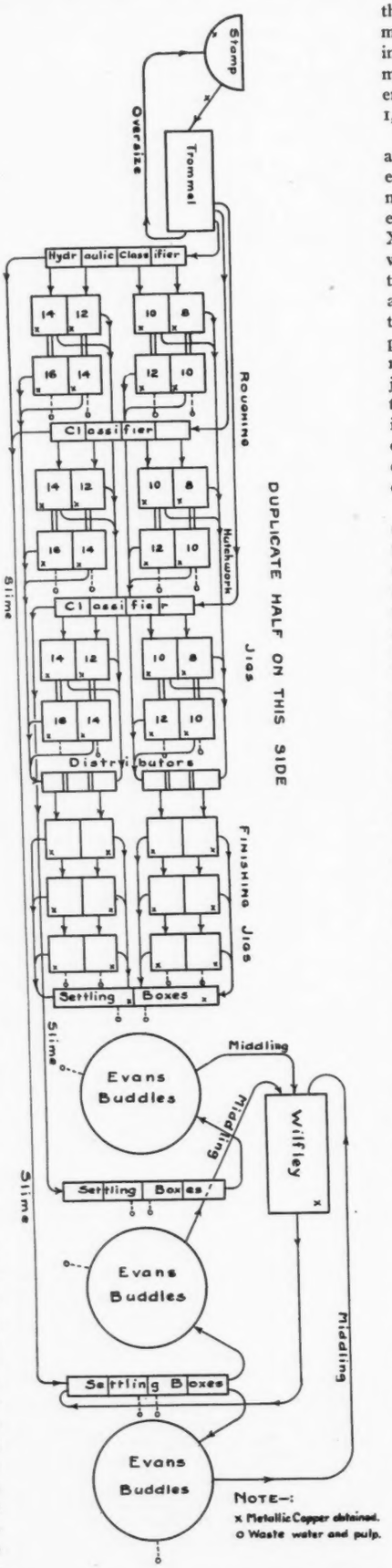
The total capacity of the 28 heads, with an average of 300 tons per stamp, is over 8,000 tons per day. Owing to repairs and alterations, the actual scale of treatment is represented

by 6,000 tons. The stamps are of the Leavitt type, and have a falling weight of 2½ tons when the shoes are new. From the bin the millstuff passes over a gently inclined iron chute, wide enough to serve as a sorting table, the ore sliding forward with the aid of a jerking movement, imparted by a crank at such a speed as to permit the man who watches the feed to pick out any lump copper.

The stamp is not turned mechanically, by the friction of the tappet and cam, as in the ordinary gravity stamp, but by impact on the ore lying upon the die; this turning is erratic, being slight for one or two drops, followed by a sudden grand whirl, according to the state of the feed.

Removal of lump copper from the mortar is effected by a jig recently invented; this has its operating end inside the mortar. There is a slot 1.5 in. wide, and 12 in. long at the base of the screen and on each side of the mortar; under this there is a chamber, 4 in. by 12 in., bottoming upon a sieve with 1-in. openings, and this in turn lies over a larger compartment, divided by a double system of valves, so that the copper can be discharged through a gate without interfering with the work going on in the mortar itself. The plunger of this jig (there being one on each side of the mortar) gives an impulse which is transmitted through the water in the successive chambers, the smaller copper product (or 'hutchwork') passing through the lower sieve, with the 1-in. openings, while the heavier pieces gradually displace the gravel within the upper chamber (the top of which is level with the bottom of the mortar screen) until it is filled with lumps of metal. This is then removed, without disturbing the wash of the stamp or jig, by opening the back of the receptacle, the contents of which are mechanically discharged into an intermediate compartment and then, after closing the upper valve, through an opening which empties outside.

It is recognized that an excessive use of water is a bad feature of the local practice, and efforts have been made to obviate this defect. To this end a jig-classifier has been devised to take the place of the V-separators in general use, and this has already diminished the quantity of water consumed by the milling operations. As the device is now passing through the Patent Office, no drawings are available, but the following description will indicate its nature: Two brass shields are placed within the body of the jig; these shields are elliptical in plan and are placed one within the other at different heights above the jig-sieve; the outer shield extends into, and is sealed by, the jigging material (sand and gravel), so that the slime is prevented from rising within the shield, and flows along the sides until it escapes over the tail of the jig. The inner shield reaches down into the copper bed lying on the sieve; the sand and gravel entering under the outer shield travel around the inner one, and finally make their exit also through a slot at the lower end of the jig, the slot being controlled by a gate which regulates the fluctuations of the load. This invention produces an economy of water because the classification is effected without the addition of any water except sufficient to run the jig, and, in fact, the slime is slightly dewatered by the settling action involved in the device. Less attendance and no plugs to choke are other noteworthy features of this arrangement, as compared with the usual hydraulic classifiers and V-shaped separators. By the use of the mortar-jig as against the Krause discharge, by the aid of the jig-classifier just described, and by a marked decrease in the number and increase in the efficiency of ordinary jigs at work in the mill, the consumption of water has been lowered from something like 2,500,000 gal. to 1,125,000 gal. per stamp per 24 hours.



SCHEME OF TREATMENT, ISLE ROYALE MILL.

The scheme of treatment is given in the accompanying diagram. This shows (wherever Cu appears) the stages at which the metallic copper is extracted, and the gradual elimination of the encasing rock. (Wherever X appears there is a product that goes to waste.) At the stamp there are two extractions of copper on each side of the mortar, as already described. On making its exit through the screen the pulp is divided so as to pass through two series of double compartment jigs, five on each side. The first two jigs have sieves 24 in. wide and 36 in. long; the next three have sieves 50 in. wide and 30 in. long; the jigs are arranged so that the compartments are in series along the course of treatment, the pulsation being on the line of the flow.

The slime separated in the first jigs, by the classifier already described, goes to a settling tank and thence to two Evans revolving tables of four decks each, the partial concentrate from these eight 'buddles'—as they may be termed—passing to four Wilfley tables, the middling from which goes to a fifth Wilfley. Metallic copper is obtained at each of the Wilfleys. Returning to the jigs: metallic copper is secured at the first two of each series, the other three yielding 'gravel,' or middling, which goes to a Chilean mill for re-grinding. The hutchwork from all the jigs goes to two Wilfley tables, and the crushed middling from the Chilean mill goes to two other Wilfleys, the middle heading from all four being returned to a fifth, the middling of which in turn goes to the Chilean mill. Metallic copper is obtained from each of these Wilfleys also. The tailing from the mill is elevated by raff-wheels of 50 ft. and 60 ft. diameter; they are tested by taking automatically, and at regular intervals, a sample which is assayed for its copper contents, and passed through successive sieves to determine the character of the crushing.

Losses in milling of these copper ores are attributable to two causes: the first is the abrasion of the metal due to its being retained within the mortar after it is released from the encasing rock, the rate of discharge being disproportionate to the enormous rate of crushing; the second cause is the existence of copper within particles of rock which have been inadequately crushed; this is especially true of conglomerate, in which the metal penetrates the very body of the hard pebbles. The copper exists in particles ranging from the microscopic to the massive; therefore, the crushing can be likened to the breaking of nuts, the kernel being liberated by the cracking of the shell; but the nuts range from filberts to cocoanuts in size, and from peanuts to brazilians in hardness. Re-grinding, therefore, is an important problem.

At present it is the practice in many mills to return the oversize from the trommels to the stamp, which is a clumsy solution of the difficulty, because much of the pulp simply travels the circuit. However, only a small proportion of the pulp can be re-ground profitably under existing conditions by reason of the high consumption of power and the excessive wear and tear involved in all regrinding machines. It can be said that only material carrying 0.50 to 0.75 per cent copper

or more will pay to treat in the Chilean mill—which, at present, holds the field.

At the Baltic mill, where this practice was first used in the copper country, 120 tons of oversize from the trommels of one unit is passed through rolls and this expedient has raised the crushing capacity of the stamp mesh screen in 24 hours. They consume an excess of power—28 h.p. per mill, equivalent to from 15 to 20 cents per ton. In the Quincy mills the Monadnock type of Chilean mill, 6 ft. in diameter, is in successful use. Each machine consumes 25.61 h.p. and crushes from 55 to 60 tons of amygdaloid per 24

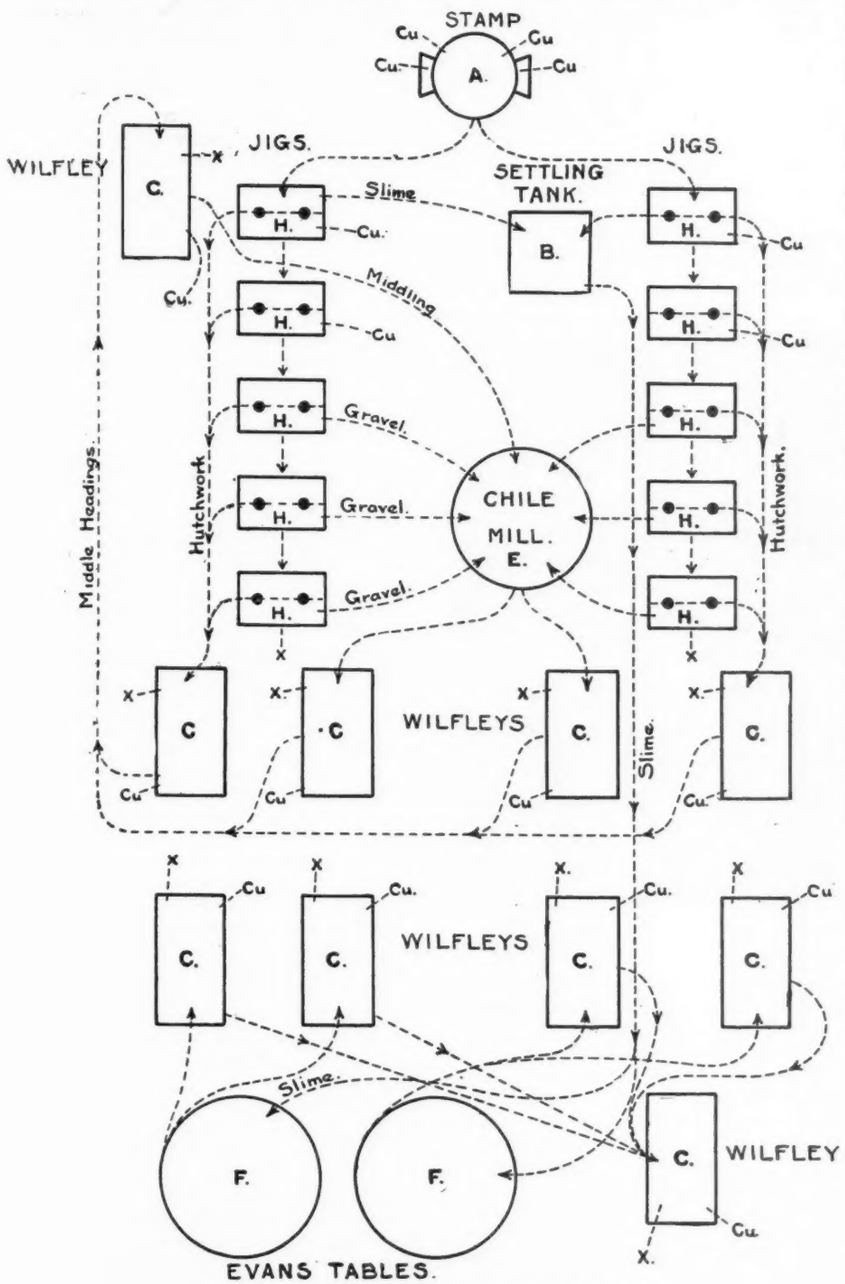


DIAGRAM OF TREATMENT AT CALUMET & HECLA MILL.

just that amount—120 tons per day. At the Calumet & Hecla plant, Heberle mills, consisting of two steel disks, eccentric to each other, and revolving in opposite directions, are used; but the superintendent is in no way enthusiastic over this machine. High-speed rolls and Huntington mills have been employed; at present the Chilean mill, both the Monadnock and the Allis type, form part of the equipment and they are said to do good work. But their capacity is small, namely 33 to 40 tons of the material commonly known as 'ragging,' from 3-16 in. down, through a 16-hours through a 10-mesh screen. The product is granular and in good condition for the Wilfleys. At the Baltic the 6-ft. Huntington mill, also working on amygdaloid, puts 51 tons of ¼-in. material through a 16-mesh screen in 24 hours. Therefore, allowing for the difference in screens, the Huntington appears to grind faster than the Chilean mill working on similar material. The Baltic mill has one Huntington to four stamps; this machine treats the 'ragging' from the finishing jigs. In this mill rolls are also used early in the operation, the oversize from trommels does *not* go back to the stamp; from the trommel with ¼-in. openings the oversize passes to Sturtevant rolls, and from them it is returned to the trommel, to take its regular course through the plant.

From indicator cards it has been shown that the Chilean mill takes 25 to 30 h.p. and the ordinary Huntington 14 h.p., even where the latter is doing more grinding. The former makes 26 to 30 revolutions per minute, the latter 60 to 65. The consumption of steel amounts to about 15 cents per ton in the one case and 2.25 cents in the other. That is on amygdaloid. The total cost of re-grinding coarse 'ragging' may be put at 10 to 12 cents per ton for the Huntington, and 30 to 35 cents for the Chilean.

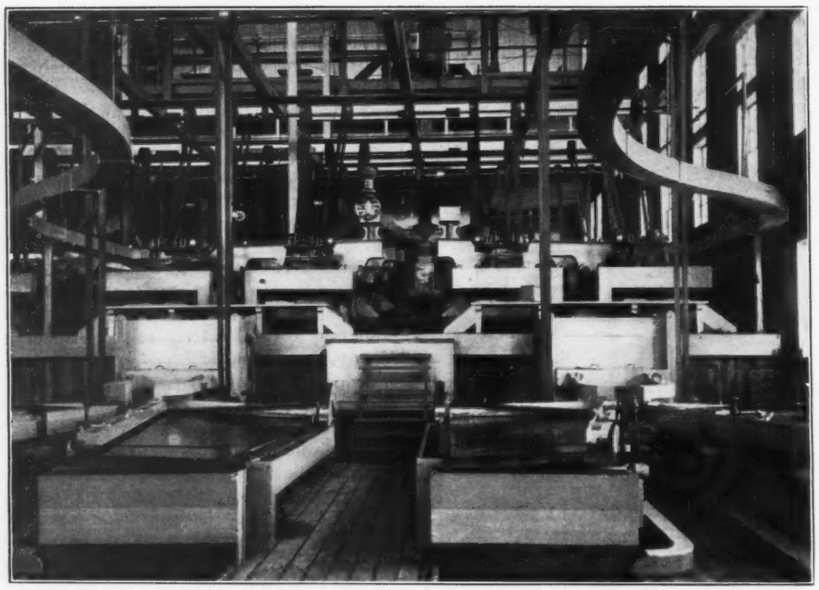
The roller of a Chilean mill has a crushing weight of about 6,000 lb., this being the actual weight of the roller, plus one-third the weight of the spider and the weight of the tire. The roller in the Huntington weighs 1,400 lb., but by reason of the centrifugal force developed by the greater speed of revolution, the virtual crushing weight of this is approximately 5,400 pounds.

The new Huntington mill now being introduced has the same diameter as the one previously in use, but it is a more powerful machine, with overhead drive, and heavier, weighing 45,000 lb., as against 26,000 lb., the weight of the usual 6-ft. machine. This increase in weight was made in consequence of experience obtained by Mr. Frank Klepetko in the concentrator of the Boston & Montana Copper Company at Great Falls. In leaving this part of the subject it may be pointed out that re-grinding machinery in a mill serves as a valuable cover to any erratic behavior on the part of roughing jigs or other devices doing similar work.

It is difficult to secure accurate data concerning the tailing losses. On amygdaloid, the Osceola tailing averages 0.018 per cent from an initial one per cent rock, making the extraction 82 per cent. At the Adventure, with 0.95 per cent rock, the tailing average is 0.26, giving an extraction of 73 per cent. At the Champion, with rock carrying 30 lb. of copper, of which 4 lb. is 'mass,' sorted out before milling, the tailing ranges from 0.30 to 0.35 per cent, equal to an extraction of 80 per cent. At the Quincy, the mill-rock contains 19.3 lb. copper per ton, and the tailing averages 0.26 per cent, indicating an extraction of 83 per cent. Speaking generally, it can be said that in treating an amygdaloid containing 1 to 1.5 per cent copper, the tailing averages 0.25 to 0.35 per cent, this being equal to an extraction of 75 to 80 per cent. On conglomerate such as that of the Calumet & Hecla, the included copper carried away in the tailing precludes a high extraction, a loss of 0.7 per cent indicating an extraction of 72 per cent on a 2.5 per cent ore.

The mill treatment, therefore, is not satisfactory; it has not, for example, kept pace in improvement with the mining methods of the region. The present practice is really to drown the mill with an enormous volume of water, not in the mortar alone, but also in the hydraulic classifiers. This is required to aid the discharge from under the stamp and to convey the crushed material through an interminable number of jigs. The stamp does not pulverize, it does the work of a rock-breaker, for it reduces only to ⅝ inch. For this work, as also for the other extreme—very fine grinding—the stamp is not adapted. But

effort toward betterment is under way and a radical departure from established practice proves that prejudice is not to cripple advancement. At the Champion mill, under the experienced direction of Mr. F. G. Coggin, gyratory crushers are to be tried, supplemented by rolls. A unit of equipment capable of treating 350 tons per day is now in course of erection. This scheme of treatment will be based on the gradual reduction of the copper rock through Gates gyratory crushers, to a size suitable for further reduction by rolls instead of steam-stamps, the idea being that if the rock can be sent to the mill already reduced to a size of 2.5 in. or less, the expensive steam-stamp is not needed. The saving to be made in this way will consist of a decrease in the power required—at least 75 per cent—a smaller consumption of water in the process of separation, and a diminution in slime, which does not exist in the broken rock as delivered to the mill, but is made chiefly by abrasion with the lump copper in the mortar. It is also intended to jig the material coarser than the present size, which is ¼ inch, in order to allow some of the coarser stuff to escape as tailing without further reduction; that portion requiring further comminution will become middling from the jigs and will be reduced by re-grinding machinery.



INTERIOR OF BALTIC MILL.

The general scheme involves the use of gyratory crushers at the mine. There is one of these at the Champion mine already; it is the 'No. 7½ Gates,' and has proved a satisfactory machine, being better adapted to the crushing of rock containing lump copper than the breakers with straight jaws. It is intended to erect a larger gyratory at the mine, so designed that the spindle can be dropped one inch, thereby overcoming the delays due to the clogging of the crusher by lumps of copper. The jaws of this crusher will be set 2.5 in. apart. It is not practicable to dump the skip or car direct into the crusher, as at the Homestake, on account of the presence of lump copper, which requires that the rock shall pass over grizzlies and undergo sorting by hand. Under the gyratory will come a conveyor, with boys to pick out pieces of copper which have been released by the passage of the rock through the crusher. Then the material passes to bins which load into cars that go to the mill. At the mill, the bins will deliver to a shaking grizzly, the oversize going to a gyratory—set at 1.5 in.—the product from which will join the undersize from the grizzlies to be elevated to a trommel, with ⅞-in. apertures. From here the material goes to roughing jigs, the oversize and undersize, respectively, from the trommel going to separate jigs, and from them to separate rolls. Thence the product is raised to three trommels, with ⅝, ⅜ and ⅛-in. openings, all the product as sized passing to different jigs, except the screening from the last trommels, which goes to cone-classifiers. At the last set of jigs a middling will be made, and this will go through rolls before being fed to the new Huntington mills, the product from which will join the fine screening from the last trommel, to proceed to cone-classifiers and thence to Overstrom tables. Experiments with this concentrator have given excellent results.

By these changes it is expected that the Champion will decrease the cost of milling and secure an increased amount of copper, possibly equal to the present total cost of milling, 25 cents per ton. This will emphasize the observation that during late years the endeavor to lessen costs has been pushed at the expense of any improvement in extraction, that is, it has not been realized that while the expenditure entailed by the treatment of copper rock has decreased, there has been no commensurate diminution in the amount of copper lost. Five cents worth of copper, per ton, lost in the tailing is worth just as much as a five-cent decrease in milling cost. It should be added that the installation proposed is purely experimental, but the intention is to put a definite tonnage through a definite process; in other words, the experiment is on a commercial scale. The design of the experimental plant is purposely made sufficiently flexible to permit of any modification, the necessity of which may be indicated by the results. There is nothing revolutionary in the scheme of treatment. It is simply an application, to the special conditions in the Lake Superior district, of methods which have been adopted in Montana and Colorado. Whatever the outcome, it is evident that this is a departure from precedent which is entirely justified; it starts an investigation of current practice such as should contribute notably to the empirical development of milling methods in the copper regions of Michigan.

VENTILATION OF COAL MINES.

In the recently issued report on the bituminous coal mines of Pennsylvania, Mr. James F. Roderick, chief of the State Department of Mines, makes the following comments on the provisions of the law relating to the ventilation of mines:

A great many complaints have been received from the inspectors in the bituminous region, regarding their inability to get sufficient ventilation in some of the mines, owing to the action of the courts in deciding that an inspector can exact only the maximum quantity of air provided by law, notwithstanding the very clear declaration in section 1, of article 4, by which he is given the right to demand as much as he may deem requisite.

It is useless to enter into a controversy with the local courts, and the matter has never been appealed to a higher tribunal. To remedy this condition, the matter was brought to the attention of the Hon. Richard Davis, of Fayette county, and he prepared and introduced the following amendment in the Legislature of 1903:

"An act to amend the first section of article four of an act, entitled, 'An act relating to bituminous coal mines and for the health, safety and welfare of persons employed therein.'

"Section 1. Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met, and it is hereby enacted by the authority of the same, That the first section of article four of an act, entitled 'An act relating to bituminous coal mines and for the health, safety and welfare of persons employed therein,' approved the 15th day of May, A. D. 1893, which reads as follows:

"'The operator or superintendent of every bituminous coal mine, whether shaft, slope or drift, shall provide and hereafter maintain ample means of ventilation for the circulation of air through the main entries and all other working places to an extent that will dilute and render harmless the noxious or dangerous gases generated in the mine, affording not less than 100 cu. ft. of air per minute for each and every person employed therein; but in a mine where damp has been detected, the minimum shall be 150 cu. ft. per minute for each person employed therein and as much more in either case as one or more of the mine inspectors may deem requisite,' be and the same is hereby amended to read as follows:

"The operator or superintendent of every bituminous mine shall provide and hereafter maintain ample means of ventilation for the circulation of air through the main entries, cross entries and the faces of every working place in sufficient quantities to dilute, render harmless and sweep away smoke, noxious and dangerous gases to such an extent that all working places and traveling roads shall be in a safe and fit state to work and travel therein.

"In non-gaseous mines the minimum quantity of air in circulation shall not be less than 150 cu. ft. of air per minute for every person

employed therein and as much more in either as one or more of the mine inspectors may deem requisite."

For some reason unknown, the representatives of the operators and miners opposed the adoption of the amendment, or at least no effort was made to get it out of committee, and consequently it failed of passage. I hope that Mr. Davis, or some other member representing the bituminous interests, will at the next session take this matter up again and secure the much-needed legislation. Either this must be done or an appeal made to the higher court for a decision regarding the matter.

It is my opinion, however, that the quantity of air needed in a mine should not be specified in the act. The first paragraph from the proposed amendment, given above, fully meets the situation.

If this recommendation were incorporated in the law, there could in future be no controversy between the inspector and the superintendent, for when a mine is amply ventilated the inspector can find no fault. More than this, it would clothe the inspector with power to demand "ample ventilation."

In some mines "ample ventilation" would mean 150 cu. ft. of air per man per minute. In others, it would mean 250 or 350 or perhaps 500 cu. ft. per minute. The only safety in gaseous mines is "ample ventilation," whatever the amount may be, and the inspector should have authority to demand what he thinks necessary.

ACCIDENTS IN THE PENNSYLVANIA BITUMINOUS COAL MINES.

In the JOURNAL for November 10, we commented on the accidents occurring last year in the anthracite coal mines of Pennsylvania, as stated in the report of Mr. James F. Roderick, chief of the Bureau of Mines of that State. We now have the statement for the bituminous coal mines, as given in the second volume of the report.

The total number of persons employed at the bituminous mines in 1903 is given in the following table, including also the men working at the coke-ovens, the nature and risks of whose employment are very similar to those of the outside, or surface, workers at coal mines:

	Number.	Per cent.
Underground	123,954	81.7
On surface at mines	17,169	11.3
At coke-ovens	10,622	7.0
Total	151,745	100.0

The report classifies the employees carefully. The following table shows this classification, with the proportion which each division bears to the total:

	Number.	Per cent.
Underground:		
Mine foremen	1,124	0.9
Assistant mine foremen	203	0.2
Fire-bosses	494	0.4
Miners	66,086	53.3
Machine runners	3,276	2.6
Machine loaders and scrapers	32,492	26.2
Drivers and runners	8,768	7.1
Door-boys and helpers	1,872	1.5
Company men	6,242	5.0
All others	3,397	2.8
Total	123,954	100.0
Outside, or surface:		
Superintendents	722	2.6
Outside foremen	406	1.5
Blacksmiths and carpenters	2,215	8.0
Engineers and firemen	2,552	9.2
Bookkeepers and clerks	996	3.6
All others	10,278	37.1
Total outside mines	17,169	62.0
Coke-oven men	10,622	38.0
Total	27,691	100.0

The number of employees during the year was the largest ever reported, exceeding that given in 1902 by 16,134 persons. It is probable, therefore, that a number of new men, and probably inexperienced men, were included. This might serve as a partial explanation of the large number of accidents. It is a fact, however, that while the number of casualties was large, the deaths decreased from 456 in 1902 to 402 in 1903; the ratio of fatal accidents per 1,000 employees also falling from 3.36 in 1902 to 2.65 last year.

The total number of deaths and of injuries inflicted upon persons employed in and about the mines, with the averages per 1,000 employees, for the year 1903, was as follows:

	Deaths.		Injuries.		Total.	
	No.	Per 1,000.	No.	Per 1,000.	No.	Per 1,000
Inside the mines	375	3.24	992	8.00	1,367	11.24
Outside on surface	27	0.97	54	1.94	81	2.91
Total	402	2.65	1,046	6.89	1,448	9.54

The occupations of the 375 persons killed inside the mines were as follows: Miners and miners' laborers, 236, or 62.7 per cent; drivers and door-boys, 44, or 11.7 per cent; all others, 95, or 25.6 per cent. The outside men killed were nearly all laborers.

The total number of casualties during the year is again shown in the following table, classified as to their causes:

	Deaths.	Injuries.	Total.
Inside the Mines:			
Falls of coal, slate and roof	238	548	786
Mine cars	60	249	309
Explosions, gas and dust	23	23	46
Explosions, powder, etc.	5	15	20
Premature blasts	9	39	48
Falling into shafts, slopes, etc.	7	1	8
Kicked by mules	1	9	10
Miscellaneous	32	108	140
Total inside	375	992	1,367
Outside the Mines:			
Cars	15	22	37
Machinery	2	7	9
Miscellaneous	10	25	35
Total outside	27	54	81
Grand total	402	1,046	1,448

In the bituminous, as in the anthracite, mines falls of roof were the most prominent cause of accident. The following table shows the percentage of the different classes of accidents:

	Deaths.	Injuries.	Total
Inside Mines:			
Falls of coal, slate and roof	63.5	55.2	57.5
Mine cars	16.0	25.1	22.6
Gas and dust explosions	6.1	2.3	3.4
Explosives and preventing blasts	3.7	5.4	5.0
All other causes	10.7	12.0	11.5
Total	100.0	100.0	100.0
Outside Mines:			
Cars	55.6	40.7	45.7
Machinery	7.4	13.0	11.1
All other causes	37.0	46.3	43.2
Total	100.0	100.0	100.0

The question of possible prevention of some of the numerous accidents due to falls of roof was fully discussed in the article on the anthracite mines, to which reference is made above.

A point of some interest, with reference to the accidents from explosions, is the classification of the mines as gaseous or non-gaseous, by the inspectors' reports. This is given in the following table:

	No.	Tonnage.	Per cent.
Gaseous mines	267	52,242,827	50.4
Non-gaseous mines	947	51,471,155	49.6
Total	1,214	103,713,982	100.0

In the gaseous mines there were employed 351 foremen and assistant foremen, and 494 fire-bosses. The non-gaseous mines report 984 foremen and assistant foremen. The average yearly output of the gaseous mines was 195,666 tons, and of the non-gaseous mines, 54,352 tons. This shows that many of the large mines must fall in the gaseous class.

Some comparisons between the anthracite and the bituminous results will be of interest. The output and the number of employees in the two regions in 1903 were as follows:

	Anthracite.	Bituminous.	Total.
Tons mined	67,171,951	103,713,982	170,885,933
No. of employees	151,827	151,745	303,572
Tons mined per employee	442	683	566

This shows a striking difference between the anthracite and the bituminous mines. Though the bituminous output exceeded the anthracite by 36,542,031, the number of men employed in the two regions was almost exactly the same. This is accounted for, in part, by the more difficult operation of the anthracite mines, and, in part, by the greater labor required in the preparation of anthracite for market.

The comparative statement of accidents in the two groups of mines is as follows:

	Anthracite.	Bituminous.	Total.
No. killed	518	402	920
No. injured	1,325	1,046	2,371
Total	1,843	1,448	3,291
Killed per 1,000	3.41	2.65	3.03
Injured per 1,000	8.73	6.89	7.81
Total	12.14	9.54	10.84

It does not necessarily follow that there is more careless management, or greater recklessness, in the anthracite region. The same causes which require a larger number of employees for a given output would tend to produce a greater number of accidents. Mines generally deeper and more fiery, greater difficulties in mining and in ventilation, and a variety of lesser causes, will go far toward accounting for the difference.

At the same time, it must be admitted that the proportion of accidents in Pennsylvania is too high, and the Department of Mines is doing well in giving careful attention to measures for reducing the number.

CEMENT MADE IN BELGIUM.—United States Consul S. H. Haine, at Antwerp, reports that Belgian cement manufacturers have lost almost all their American market. The United States was formerly one of the best customers of Belgian manufacturers, but within the last two or three years has practically emancipated itself from European manufacturers, and produces a surplus, which, it is expected, will be offered on European markets. This has caused a serious depression there, where prices reached in 1903 their very lowest limit. Many factories have been transformed, both as to machinery and methods, in order to meet the depression.

A CORNISH COMBINATION.—United States Consul J. G. Stephens, at Plymouth, reports that the producers of china stone in Cornwall have associated together with the object of increasing the price of their product, the agreement taking effect January 1, 1905. The annual output of china stone is about 50,000 tons, a large portion of which is utilized in the Staffordshire potteries, while considerable quantities are exported to the Continent and the United States. It is stated that the output will not be increased. One great object of the combine is the control of terms and dates of payment. While prices in the past have been cut very low, extended credits have had to be given, and producers have been very much in the hands of buyers. Credit extending over 18 months has not been uncommon. Under the new arrangement only three months' credit will be given. The rise will be about 60c. per ton over present prices.

ELECTRIC DRILLING, DREDGING AND PUMPING.

By GEORGE E. WALSH.

The pretty general introduction of electricity in mines to operate compressors, hoists, pumps and drills calls for data concerning their actual operation that cannot always easily be obtained. If greater economy and efficiency are to be secured from the electric power in mines, current must be supplied in large quantity and at the minimum of cost. In the Standard and Hecla mines, where four General Electric 300-h.p. induction motors are used to drive the compressors, hoists, etc., current is supplied at very low rate by the 110-mile transmission line of the Washington Water Power Company, from its huge generating station at Spokane falls, and the electric operation of the mine machinery has proved the most economical and efficient on record. So apparent is this that it is likely mines along the route of the long-distance transmission will take advantage of their opportunities until nearly all of the current, generated at a working voltage of 60,000 at the power-house, will be absorbed for mining purposes.

In the operation of electric drills, practical tests indicate more clearly and exactly the cost of the work than can be ascertained from either steam or compressed air tests. At the mines of the Consolidated Cariboo Hydraulic Company, at Bullion, British Columbia, electric drills have been operated for some time by direct-current portable 1.5-h.p. motors. driven by 110 volts, and also by 2-h.p. motors. Three drills averaged 312 ft. of holes in 10 hours through solid rock. The cost of current was $2.25, and lubricants 35 cents. The drillmen's wages were $4 per shift, with a helper at $2; a blacksmith at $4, and a helper at $2 must be added. The total cost of running the drills for 10 hours amounted, therefore, to $31.55. Compared with hand-drilling there was a saving of about $50, for the same amount of work had cost the company in the past about $91. A modification of these figures could be made if wages of workmen were lower, or if a large amount of current could be obtained from some great hydro-electric plant. The power at the above place was generated by steam-engines, and the results can not be considered as an indication of the highest efficiency attainable.

A more satisfactory test of electric drills was made for the purpose of determining the consumption of power without reference to wages. Under this test, which was extensive enough to give good averages, an 86-in. hole, two inches in diameter, was drilled in 19.08 minutes at an expenditure of 3.95 h.p. The total consumption was 940 watt-hours, or 131 watt-hours per foot. The cost was ten cents per kw.-hour, which at the rate of 131 watts per foot drilled, would bring the cost down to 1.31c. per foot. As compared with steam or compressed air, this consumption of energy and its relative cost show a remarkable economy. The minimum cost of drilling with steam or compressed air is about 10c. per foot, indicating a saving of 8.69c. per foot.

The electric drill is far from being as popular as the air drill in the Western mines, although it is steadily making headway, and it is apparent that the difficulty of securing proper current from outside sources is the chief obstacle. Where mining operations are conducted on a scale sufficiently large to warrant the harnessing of some neighboring mountain stream or waterfall, the introduction of electricity for nearly all mining purposes is assured. In some instances the change to electric power has been made at great expense with the expectation of saving enormously in the end. The No. 2 and No. 3 shafts of the Wolverine mine, Michigan, for instance, are now being equipped with electric power, for the operation of all machinery, at an estimated cost of $40,000. With a capacity of 500 to 750 tons of ore per day, the new power plant is expected to save from 30 to 40 per cent in operation, and increase the output from 25 to 30 per cent. If this is accomplished the investment of new capital will be more than justified.

The greatest troubles in the mines of South Africa have been experienced in drilling, as the lodes wind about and change thickness and shape in the most exasperating manner. Hand-drilling has been retained in many mines because this method rendered it easier to follow the changing lode than in the case with machine drills driven either by compressed air or steam. Nevertheless, owing to their extreme mobility and flexibility, the portable 1-h.p. and 2-h.p. electric drills have, to a large extent, supplanted the hand-drills. Costs are much less, while efficiency and general output are both increased. Even with cheap black labor, hand-drilling has been found to be more expensive than electric drilling, when the difference in the amount performed per day is balanced against the working cost.

In the operation of hoists, stamp-mills and dredges, electric power has been of great help in the West. This is exemplified by the dredges at Oroville, in California, such as those of the Central Gold Dredging Company. These dig from 50,000 to 75,000 cu. yd. per month by the aid of 30, 40 and 50-h.p. motors.

The largest of them is fitted with 85 buckets, each having a capacity of 5 cu. ft., working at a speed of 22 buckets per minute. They are built to cut through loose soil, hard-pan and even soft rock. The 50-h.p. motor drives the bucket chain, and a 15-h.p. motor controls the winches and the movement of the boat. Another 40-h.p. motor, direct-connected to a powerful centrifugal pump, furnishes all the water for washing the gravel. A 30-h.p. motor is also connected with the plant for working the sand-pump, which carries the accumulated sand behind the boat to the tailing heap through a long pipe, and a 3-h.p. motor is used for operating a deck- and bilge-pump for general washing purposes. The shaking screen of this dredging plant is also operated by a motor, of 15 h.p. on the larger dredges, and of 10 h.p. on the smaller plants. Finally, there is a 15-h.p. motor to drive the stacker or conveying belt which disposes of the stones. This stacker is 30 in. wide and 90 ft. long, and it is capable of handling an enormous amount of material.

The construction and operation of this type of gold-dredging plant represents a new phase of mining. Similar plants have been installed by the Yuba Consolidated Dredging Company near Wheatland, California. At this place a 100-h.p. motor is used in digging, and a 50-h.p. for the centrifugal pumps. The variable speed motors of this dredge make it possible to cut at any desired rate, and the swing of a cut is about 90 ft. wide. The bucket line can be run fast or slow, and a single man can run the machine, controlling operations, so that the digger will do the work of several hundred men. The electrical equipment is so complete that the rocks and soil are torn up with ease, and the boat digs its own canal as it progresses.

The Ashburton Mining Company, at Folsom, California, has the largest electrically operated gold dredge ever built. It has 7.5-ft. buckets, and one 150-h.p. motor drives the bucket chain. A 20-h.p. motor drives the deck winch, and a 75-h.p. motor controls the centrifugal pump. The stacker is driven by a 20-h.p. motor, and a 10-h.p. motor runs the deck pump. The shakers and screens are all worked by the latest methods, and they, together with the bucket chains and stackers, are under the control of the engineer.

The construction of these giant dredges has been going on so rapidly in the past few years that nearly forty are in operation today in California, while a considerable number have been ordered for Alaska. Each one is a complete plant in itself, and every part of its operation is dependent upon electricity. Without this power it would be impossible to concentrate all the different operations in such a complete unit.

In all drilling and dredging by electricity the cost of current varies greatly; in California the extensive harnessing of the mountain streams has supplied electric power to the mines at a minimum of cost. It is therefore to be expected that mining machinery will be operated on a much larger scale in California by electric power than elsewhere, and the results already obtained furnish abundant testimony to the value of electricity in this mining country.

In South Africa electricity has been introduced so largely that it is a formidable factor in deciding the relative profits of gold mining. On the Rand, in particular, electricity has supplanted nearly all other power for operating the mine pumps. Before the Boer war electric motors were in use in the Knight's Deep mine, and their number has been increased since then. In the Robertson shaft of the Knight's Deep three eletrically driven high-lift pumps have been in operation for some time, so that their value can be appreciated. They deliver 400,000 gal. per 24 hours against a head of 1,250 ft. Prior to their installation it was impossible to make satisfactory headway against the water in this shaft. Altogether there is upward of 20,000 h.p. expended in pumping water from the Knight's Deep mine on the Rand, and three-fourths of it is done by electricity. Even before the Boer war electric power had made good progress in driving the mine pumps. Upward of 2,500,000 gal. was pumped daily from the mine, and nearly half of this was done by electricity.

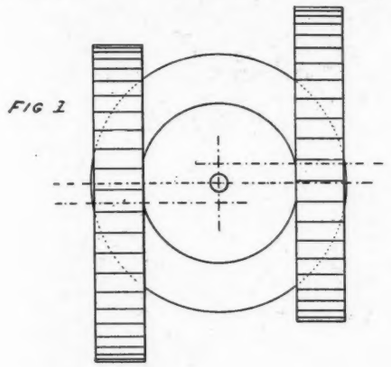
The question of operating stamp-mills, hoists and haulage systems is somewhat different from that of drilling, dredging and pumping. Where a hydro-electric plant has been installed by a mining company, or where large current is supplied at low cost from outside sources, the tendency is to use electricity exclusively; but otherwise steam and compressed air continue to retain their popularity among mine-owners. As the question of fuel is paramount in such cases, the local differences prevent any general rule of action, and statistics of cost of operation are of little value unless the careful consideration of all details is included in the comparisons.

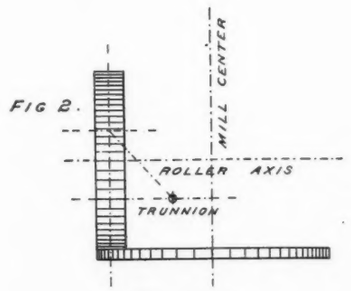
Diamonds, 20 carats down to one-fourth carat, for drawing wire, consumed in the United States, amount annually to about 4,000 carats.

CHILEAN MILLS.

By M. P. Boss.

The Chile mill, as its name implies, was of Latin origin, while the stamp was of Saxon. In its crudest form it was a circular stone with a hole through the center, through which passed a pole, one end of which was attached to a post, while the other end was propelled by an animal. This machine was developed in its native environment into a mill with two wheels, having iron tires and driven by water or steam. Under foreign influence it developed numerous modifications, among which are the fast-motion edge-running roller-mills now quite common. In its original form, with slow motion, the centrifugal action or the tendency to go in a straight line, instead of its circular course, was not great, but when it developed into massive form or into high speed, this tendency became important, and different means were devised to neutralize the outward thrust on the axle. In the massive





CHILEAN MILL.

slow-motion mills, like those of El Bote of Zacatecas, or La Union of Pachuca, the Mantey offset is effectively used. It is also used on some fast-motion mills. Some have rollers inclined toward the center, like a railroad train rounding a curve; others are trunnioned at a point below the axle, so that a portion of the outward thrust is diverted to augment the downward pressure of the roller upon the die. In this day a fast-motion roller-mill that employs no means to utilize, at least partially, the centrifugal thrust of the roller to the crushing can hardly be rated as high-class mechanism because of its wastage of force. The Mantey offset has the axle of the wheel set behind a diameter line to which it is parallel, so that in the turning of the mill the roller, not being true with the die, is more or less shoved over it, while at the same time it revolves. When the offset is properly proportioned to the speed at which the mill runs it is, as before stated, thoroughly successful, but as the resistance is that of grinding, it has the objection of consumption of power and metal common to grinders in the ratio of this action. When a roller is inclined properly to the speed at which it is run the thrust force is entirely exerted upon the inclined bed or die without loss. A vertical roller, trunnioned at a point below its axle, as in Fig. 2, utilizes the centrifugal thrust of the total weight of the roller, less that portion that lies below a horizontal line through the trunnion, plus its balancing equivalent above said line. With the advent of faster-motion mills, it has become quite general to use more than the two wheels or rollers common to Spanish-American mills. If a given weight is put into two rollers, instead of three or more, it is simpler construction, having fewer parts and is presumably cheaper, and it is also more convenient for examination and repairs. A large roller presents a more acute angle to its bed than a small one, for which reason it is less gouged by hard particles in its path, consequently its proportionate wear is less. In the accompanying sketches, Fig. 1 is a plan of mill, showing Mantey offset; Fig. 2 is an elevation, showing the roller trunnioned below its axis.

HOISTING FROM GREAT DEPTH.

The following letter, addressed by Mr. James McNaughton, general manager of the Calumet & Hecla, to Mr. Hennen Jennings, consulting engineer to Wernher, Beit & Co., appears in our lively contemporary *South African Mines*. The information given reaches us in a curiously roundabout way, but this will not lessen its value:

"Our experience with the balance rope in connection with the Whiting hoist at the Red Jacket shaft is entirely satisfactory. The hoisting rope is 1.75 in. in diameter, hoisting ropes from center to center 7 ft. 3 in. Thus far we are using a 1⅜ in. ordinary lay balance rope made of crucible cast steel. We use a bronze sheave, traveling on guides, at the bottom of the shaft. We have accomplished several interesting improvements by introducing the balance rope. First, the load is much more easily started; the engine more easily handled; consumption of steam is less, although as yet we have no definite figures; and, greatest of all, the swaying of the hoisting rope has been almost entirely eliminated. This swaying, as you can readily see, was very hard on the shaft guides. Of course, we cannot as yet give any data as to the lasting qualities of the balance rope, but if properly constructed and sufficiently flexible, I can see no reason why it should not last a long time.

"We have since put a balance rope in the two west compartments of the Red Jacket shaft, in connection with a small Whiting hoist we have had for handling the double-decked cages upon which our men and supplies are handled. The hoisting rope is a 1.25 in. plow steel, 7 ft. 3 in. center to center; the balance rope is 1 in. in diameter, crucible cast steel, with bronze sheave working in guides as in the other two compartments mentioned above. Previous to using this balance rope in connection with the double-decked cages, we had a great deal of trouble in lowering our men (40 on both decks) on account of its being so heavy for our brakes. Since putting on the balance rope, however, this feature has been entirely eliminated, and the workmen who travel up and down in the cages are very much pleased on account of the cage running so much more smoothly.

"Previous to about a year ago we used grooved wooden blocks on the driving sheave of the Whiting hoist, but within the last year we put in Walker differential rings. These rings are giving entire satisfaction, and are already showing that the hoisting rope will give much longer life, to say nothing of eliminating the labor and annoyance of changing wooden blocks frequently."

FINE CRUSHING OF BANKET ORE.*

By W. A. Caldecott.

Before the introduction of the cyanide process, fine screening, with amalgamation in mills, gave the best result. When cyanidation became common, but before slime-treatment was introduced, coarse-mesh was employed to keep the slime at a minimum; this also gave a greater amount of leachable sand. For a time successful slime-treatment was checked, because the actual extraction was lower and the cost higher than the extraction and cost, respectively, of sand.

Rand practice, before the war, in a word, consisted of wet stamp-milling, with screens of 26-mesh. The pulp leaving the plates carried 10 per cent of the coarsest product, the spitzlutte concentrate; 65 per cent of the medium, the sand; and 25 per cent of the finest, the slime. These were cyanided separately.

After the war, with idle stamps in most mills, it was possible to use finer screens without reducing the monthly tonnage or overtaxing the slime-plant. At present most Rand companies are making as much slime as can be handled, and extensive additions are in progress for treating the finest product.

In large plants of sufficient capacity and provided with big pumps, the slime shows a higher extraction, at a lower cost, than do the leachable sand and concentrate from the same ore, even though the former carries less gold before treatment than the latter. Thus, ore from deep mines gives an extraction on slime (carrying 2 to 4 dwt.—$2 to $4) of 83 per cent, at a cost of about 2s. ($0.50) per ton.

It is well known that the richest tailing from the cyanide plant was that from the spitzlutte concentrate; here the gold seemed to be encased, as it yielded better extraction by finer grinding. The principle of higher extraction by finer grinding has been shown already in the Boss process and in the Kalgoorlie methods, and it has been emphasized in application to the banket ore in a paper by Mr. H. S. Denny.[1]

But there may be another reason which renders finer grinding imperative; that is, the compactness of the ore with greater depth. This would apply especially to the coarse spitzlutte concentrate. Thus the tailing from ore mined at the 2,000-ft. level, when milled to 35-mesh, retained much encased gold as compared with that from the outcrop zone and milled to 26-mesh.

In searching for the condition of this encased gold, the product leaving the plates was classified as follows: (1) barren quartz grain, (2) granular auriferous pyrite, (3) quartz sand with adherent auriferous pyrite, (4) slime made up of clay, quartz, pyrite and free gold. Of these numbers, (2) and (3) were put to the test, as they concern the spitzlutte concentrate. It was ascertained "that, although seven-eighths of the total pyrite was

* Abstract of a paper read before the Institution of Mining and Metallurgy, London, October 20, 1904.

[1] *Journal* of Chemical, Metallurgical and Mining Society of South Africa. April, 1903, p. 348. This JOURNAL, September 26, October 10 and October 24, 1903.

removed with the pyritic portion, little more than three-eighths of the gold present was thereby separated; also that there is four times more gold per unit of pyrite contained in the sandy portion than per unit of pyrite contained in the pyritic portion." Again, from the concentrate the pyrite and sand were separated by a heavy solution. Here also the sand showed that the adherent pyrite carried two-fifths of the total gold, or four times more gold per unit of pyrite than the pyrite in the pyritic portion proper. It was also ascertained that, in spite of the friability of pyrite, "the influence of finer reduction in lessening the amount of gold lost is greater than the inverse influence of increased pyrite contents"; this refers to the slime.

The cost of installing, running and repairing vanners or Wilfleys seems to make other cheaper methods feasible. "In practice the desired separation seems best achieved by passing the spitzlutte product continuously through a re-grinder, then over amalgamated plates, returning it thence to the mill pulp launder delivering to the tailing wheel, so that any insufficiently reduced particles may gravitate back again from the spitzlutte for further grinding. This plan has been adopted in the recent trials at the Glen Deep, with separation of the pulp, passing over the spitzlutte, into two products only, sand, and slime for subsequent cyaniding." This will also result in the eventual use of more perfect hydraulic classifiers.

Amalgamation in the case of the Simmer & Jack ore, with 26-mesh, extracted 54.6 per cent of the gold, and on Robinson Deep ore, with 35-mesh, it gave 62.5 per cent. Great extensions of cyanide plants, to handle the slime, will be erected in the future. The cost of regrinding to a slime at Kalgoorlie is quoted[2] as 1s. per ton from 30-mesh. This was in tube- or flint-mills; to offset the cost of power and linings, it is suggested that banket ore, broken to suitable size, may be substituted for flint pebbles.

On the whole, it appears not improbable that the present economic 90 per cent recovery, from all sources of a first-class plant from $10 ore, will be raised to 95 per cent; and at an increased expense of less than one-half the value of the additional 5 per cent of gold won. The paper was supported by much detail, for which reference should be made to the original article by Mr. Caldecott, and also to the discussion following thereon.

COST OF CYANIDING.—The cost of cyaniding the tailing per ton at the Lead cyanide plant, in the Black Hills, for 1902, was as follows:

Classification, labor and supplies		$0.017
Treatment—		
Cyanide	$0.152	
Labor	0.030	
Lime	0.022	
Supplies	0.005	
		0.209
Precipitation, labor and supplies		0.026
Power, labor and supplies		0.051
Water		0.026
Assaying, labor and supplies		0.013
Refining, labor and supplies		0.006
Miscellaneous		0.005
Total		$0.353

Comparative figures from other plants are as follows: City & Suburban (South Africa), $0.55; Geldenhuis Estate (South Africa), $0.605; Geldenhuis Deep (South Africa), $0.62; Robinson (South Africa), $0.62; Worcester (South Africa), $0.72; Liberty Bell (Colorado), about $0.50 per ton.

[2] Charleton, 'Gold Mining and Milling in Western Australia,' 1903.

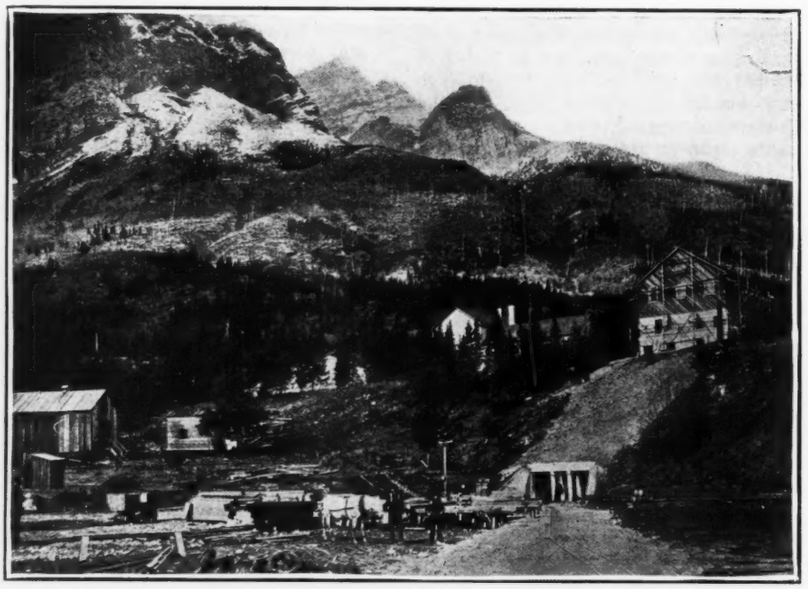
THE BANKHEAD COLLIERY IN ALBERTA.

We are indebted to the *Canadian Mining Review* for the following account of the colliery which the Canadian Pacific Railway Company is opening on a large scale at the new town of Bankhead, in the vicinity of Banff station, in the territory of Alberta. The company has already spent a large amount of money in opening these deposits, and expects to employ a large force in the operation of the mines.

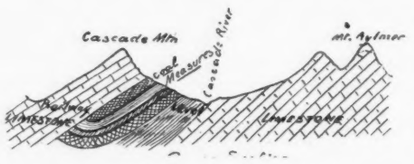
In the autumn of 1902 some prospecting work was done on the croppings of coal seams which showed on the south and southeast sides of Cascade mountain, some three miles northeast of the station at Banff. This work showed the existence of a score of beds of coal, varying from 4 to 16 ft. in thickness, and diverse in quality. The next year, 1903, a small organized force, under technical direction, was sent into camp on the plateau which now forms the town site of Bankhead, and the season was spent in further examination, and in opening two or three of the best seams, all of which dip westerly at an angle of about 45° into the mass of Cascade mountain. It was found that the lower coal-beds were similar to the one at Anthracite, Alberta, the coal being semi-anthracite in nature, and having the approximate composition of 84 to 86 per cent of fixed carbon, 8 to 10 per cent of volatile matter, and about 6 per cent ash. These lower beds lie between hard sandstones of Cretaceous age; they average 8 ft. in thickness, and the coal ignites more freely than Pennsylvania anthracite. They resemble the coal from Anthracite in being more friable than the American hard coal.

The upper beds were semi-bituminous, having an average composition of 75 to 80 per cent of fixed carbon, 14 per cent of volatile matter and 10 to 11 per cent of ash. These lie usually between shale roofs and sandstone floors, and vary in width; they have not been developed to the same extent as the lower beds, and no shipments from them have yet been made. The sales of anthracite coal now run from 200 to 250 tons per day.

During 1903 the two lower seams, numbered respectively No. 1 and 2, were opened by gangways for a distance of about 2,000 ft. A small tipple and sorting shed, or breaker, was erected, from which coal could be transferred by wagons to the spur from the main line. In March of this year works of a permanent character were decided upon and begun, and, under the management of Mr. W. H. Aldridge, and Mr. W. S. Ayres, the mining and mechanical engineer in charge, are now well advanced, but will not be completed until late in 1905.



ENTRANCE TO MAIN TUNNEL AT BANKHEAD.



GEOLOGICAL SECTION OF COAL.

Owing to the dip of the beds into the mass of the mountain, and to the fact that its southerly flanks are covered with large deposits of gravel—Cascade mountain lies at the junction of the Cascade river with the Bow river—and also owing to the fact that the outcrops of these coal seams lie at an elevation of several hundred feet above the bottom lands of the valley, it was deemed best to reach these coal-beds through a long tunnel driven through the gravels into the mountain, in order that the coal might be delivered directly to a spur of the railway, the grade of which should not exceed 1 per cent.

This main entry tunnel, 22 ft. by 9 ft., starts a little below and to the west of a bench or plateau, which has been selected for the site of the town of Bankhead, which now has a population of about 500, and, by the spring of 1905, will have 1,500. The lower or entry bench affords ample space for side tracks, storage, machine shops and all the plant incidental to a coal mine. Both benches have good drainage, are supplied with fresh water for domestic and fire purposes (by gravity) from the Cascade river, and are lighted by electricity. The plant, which is partially installed, will have its power supplied by four 150-h.p. boilers. Haulage from the rooms and on the surface

will be effected by compressed-air locomotives, and there is also a separate compressor for supplying air to the coal-cutting machines. A permanent coal breaker, with a capacity of 3,000 tons per diem, is now being erected.

On the upper bench a model town is rapidly assuming considerable dimensions; between 50 and 60 dwelling houses, each of different design, an office building and a "mess" house are finished, while other dwellings and two large boarding houses are nearly completed. The town site has an ideal location, having the mass of Cascade mountain to the west, and the magnificent panorama of the Bow valley to the southeast, while Mounts Rundle, Inglismaldie and other high peaks of the Rocky Mountain park are on every side.

Much attention has been given, in the opening up and equipment of the mines, to the matter of making them as safe as possible from explosions and fires. The free circulation of air is provided for by upper levels; the main gangways are protected by 60-ft. chain pillars, and the counter by 40-ft. What is known as the panel system has been adopted; rooms with 60-ft. centers are driven, the start from the gangway being 12 ft. wide, but increasing to 24 ft., and leaving pillars of 36 ft. for support; these pillars are drawn as soon as the room-coal is won out of any particular section.

No attempt has been made to estimate the available tonnage in any of the seams, but the width and extent of the outcrops assure the supply for many years. From the point at which the level of the main entry will cut the chief seams of the measures, the average length on the rise will be about 2,000 ft., thus assuring the company of coal for years before sinking need be considered. The market for the anthracite coal is very large, and will grow steadily with the settlement of the grain lands to the eastward. The major share of the domestic trade as far east as Winnipeg is assured, now that the mines at Anthracite have been exhausted. There is also a large market to the westward, throughout the towns in British Columbia and along the Pacific Coast. At present the coal at Bankhead is the only anthracite field of any moment in the Dominion. The chief competitors will be the lignite coal from the Galt collieries at Lethbridge, which is an excellent domestic coal, but which lacks the heat units and the lasting qualities of the Banff product, and Pennsylvania anthracite, which is brought into Fort William during the summer months in large quantities and distributed in the late fall.

The photograph reproduced herewith shows the entrance to the main tunnel and gives an excellent idea of the mountainous character of the surrounding country. The small sketch given illustrates the geological position of the coal seams, and was prepared by Mr. J. M. Turnbull.

AMETHYSTS IN NEW JERSEY.—Amethysts in beautiful specimens have been found on the Haledon property and in the Sourbut quarry, at Paterson Falls, New Jersey. The crystals are generally very dark purple at the points, turning into white at the base, and occur associated with apophyllite and other zeolites in a trap rock, being found in the blasting for that rock, which is extensively used as a road-making material in the vicinity of Paterson and other places in New Jersey.

MINT AND ASSAY BALANCES.

It is well known that in the great mints of the world the balances used for weighing bullion and coin play an important part, and that they must have the nearest possible approach to perfect accuracy. They must, therefore, be finished by makers having the best facilities for exact work, and the highest reputation.

The balances required for the new mint of the United States at Denver were ordered from Henry Troemner, of Philadelphia, a maker of long experience. The order included coin balances, free assay balances, three bullion balances, carrying 20,000 oz.; two carrying 10,000 oz.; two carrying 2,500 oz.; six carrying 1,500 oz.; with all the necessary weights and other equipment. The sensibility of the 1,500-oz. balances is 0.001 oz.; of the larger balances, 0.01 oz. each.

Another important order given to Mr. Troemner is for balances to be used in the new Chinese Imperial mint at Peking. Of these, 15 are coin balances, having a sensibility of 0.1 grain. Two are bullion balances, having beams 3 ft. in length and weighing up to 2,000 oz. One has a 5-ft. beam, and will weigh 5,000 oz. of bullion.

BULLION BALANCE, 10,000 OZ. CAPACITY.

The largest and most interesting is of a size not often seen, and is shown in the accompanying engraving. It will weigh at one time 10,000 oz. of bullion, or about one-third of a ton; while its sensibility is 0.01 oz. It is the largest balance of the kind ever made.

This great balance is 10 ft. in height, 9 ft. in length and 3 ft. in width. The weight of the machine itself is 2,000 lb. The beam is made of a special alloy of aluminum, which has very nearly the tensile strength of steel. It is 6 ft. long, weighs 68 lb., and has withstood a test of 42,000 lb. pressure. It is protected by a glass case, supported by the column and beam rests. The column is of cast iron, planed and highly finished. It is square in shape, and into its four sides are fitted glass sashes. It is utilized as a case in which the spear, or indicator, attached to the beam, works. The ivory index, across which the point of the indicator travels from right to left, is also fitted in the column. This shows the distance the beam has moved from equilibrium, when the balance is weighing the material submitted to it.

The bearings and edges are of steel, which was specially hardened, so as to prevent the cutting of the former by the latter, which is nearly a razor-edge, when the great mass of the weight is let down on the bearings. The necessity of this special treatment of the bearings will be appreciated when it is considered that, should the edge of the knife turn over, or become blunted, or the bearing receive the slightest scratch, the sensibility of the balance would be ruined. The whole efficiency of the scale is dependent entirely upon the accuracy of these two parts, so exact and sensitive is the instrument.

The platform, or base, is made of iron, which is planed to a perfect level, and polished on the top. It is absolutely necessary to have the top of the platform smooth and of a high finish, because at times it will be used to weigh fine gold dust, and owing to the value of this metal, should any be spilt on a rough, uneven surface, it would be very difficult to recover it. On the smooth platform furnished the scales, it can easily be swept up and saved. The plates and arches are of hard, hammered brass, and the pan, which is seen in the illustration, is spun by hand out of one piece of fine tempered steel. It is intended to be used when weighing gold dust or coin.

AGATIZED WOOD.—Agatized wood from the petrified forests of Arizona was on exhibition at the Louisiana Purchase Exposition. Single stumps, weighing one ton or more, each stump 5 or 6 ft. in length, and slabs 5 ft. in diameter, magnificently polished, formed part of what is considered the finest collection of its kind ever shown to the public.

Sedimentary rocks are distinguished from metamorphic, or igneous, rocks by their physical characters. They are often plainly fragmental, or, like limestones, they are of a composition unknown in any but sedimentary rocks. Fossils are almost infallible evidences of the sedimentary origin of the rock which contains them.

CEMENT ROCK OF THE LEHIGH DISTRICT.

According to a monograph prepared by Edwin C. Eckel for the United States Geological Survey, the Lehigh district of the engineer and cement manufacturer has been so greatly extended in recent years that the name is now hardly applicable. It originally included one small area, four miles square, located along the Lehigh river, partly in Lehigh county and partly in Northampton county, Pa., which contained the villages of Egypt, Coplay, Northampton, Whitehall and Siegfried. The cement plants which were located here at an early date secured control of most of the cement rock deposits in the vicinity, and plants of later establishment have, therefore, been forced to locate farther and farther away from the original center of the district. At present the district includes parts of Berks, Lehigh and Northampton counties, Pa., and Warren county, N. J., reaching from near Reading, Pa., at the southwest, to a few miles north of Stewartsville, N. J., at the northeast. It forms, therefore, an oblong area about 25 miles long from southwest to northeast, and about four miles wide. Within this area about 20 portland cement plants are now in operation, and the total yield produced in this relatively small district amounts to approximately two-thirds of the entire United States output.

Throughout most of the Lehigh district the practice is to mix with a relatively large amount of the cement rock or argillaceous limestone, a small amount of pure limestone, in order to bring the lime-carbonate content of the mixture up to the percentage proper for a portland cement grade. In the plants located near Bath and Nazareth, however, the practice has been slightly different. In this particular area the cement rock quarries usually show rock carrying from 70 to 80 per cent of lime carbonate. The mills in this vicinity, therefore, require practically no pure limestone, as the quarry rock itself is sufficiently high in lime carbonate for the purpose. Indeed, it is at times necessary for these plants to add clay or slate, instead of limestone, to their cement rock, in order to reduce its content of lime carbonate to the required figure.

The cement rock is a dark gray to black, slaty limestone, breaking with an even fracture into flat pieces, which usually have smooth, glistening surfaces. As the percentage of lime carbonate in the rock increases, the color becomes a somewhat lighter gray, and the surfaces of the fragments lose their slaty appearance. The pure limestones added to the cement rock are commonly gray, and break into rather cubical fragments. The fracture surfaces show a finely granular structure, quite distinct in appearance from the slaty cement rock. In composition the limestones commonly used will carry from 90 to 96 per cent of lime carbonate, with rather less magnesium carbonate than is found in the cement rock.

What may be considered as typical American practice in the manufacture of portland cement from dry material, owes its present success largely to the works of the Lehigh district. Previous to the commencement of portland cement manufacture in Pennsylvania dry processes had not been looked upon with favor. The European plants then in existence used wet processes exclusively. It was the rotary kiln that made a dry process not only possible but advisable.

The extraordinary growth of the cement industry in recent years is largely due to this district.

BOOKS REVIEWED.

Grundzüge der Siderologie. Dritter Theil. Die Hüttenmännischen Prozesse. By Hanns Freiherr von Jüptner. Leipzig, Germany; Arthur Felix. Pages, 276; illustrated. Price (in New York), $3.25.

This volume concludes the manual of iron and steel by the distinguished professor of metallurgy at the Vienna School of Technology. The work is a characteristic monument of German scholarship, wherein calculus and metallography walk hand in hand with ore mixing and furnace practice. Art is long; but no student or manufacturer can afford to disregard the rich harvest of research, both theoretical and practical, which, in this volume, is presented under the headings of 'Iron Alloys' and 'Blast Furnace Practice.' The only regret one feels, in reading this beautiful product of photography and printing, is that such wealth of needed information could not be given out in one world-language for the common and instant use of metallurgy.

Twenty-second Annual Coal Report of the Illinois Bureau of Labor Statistics. 1903. David Ross, Secretary of the Board. Springfield, Ill.; State Printers. Pages, 464; illustrated.

This report contains full statistics of the work accomplished in coal mining in Illinois during the fiscal year ending June 30, 1903. These include production, consumption and disposition of the coal; cost, wages and prices realized; methods of mining; and, finally, accidents resulting in mine operation. The reports of the mine inspectors add many details as to the work in the different districts and at the larger mines. Illinois is second among the coal-producing States, and the mines include some large and important operations. We have already published in the JOURNAL an abstract of the statistical part of this report. It contains much that is of value to those interested in coal mining and in the western coal trade.

Report of the Department of Mines of Pennsylvania. Part I, *Anthracite Region.* Part II, *Bituminous Region.* James E. Roderick, Chief of Department. Harrisburg, Pa.; State Printer. Pages, 728 and 1076.

The gradual expansion of the coal interests of Pennsylvania, and the fuller collection of statistics with regard to the mines, have compelled the separation of the yearly report into two volumes, which treat of the anthracite and the bituminous regions, respectively. This separation is well, for other reasons than the mere bulk of the volume. While they have, necessarily, certain points of resemblance, common to all coal mining, the conditions in the two regions differ widely as to methods of mining, handling and marketing the output. Pennsylvania produced last year a little over one-half of the coal mined in the United States, including practically all the anthracite and 37 per cent of the bituminous, so that its predominating importance is well established. The statistics of this great output are carefully collected and compiled, and they are presented in these two volumes in tables, which deserve careful study. In addition to this, the reports of the district inspectors present many details of the work in different sections of the State.

Mr. Roderick's introduction contains some practical suggestions as to the prevention of accidents and the improvement of the mining laws of the State. We have, in our columns, already referred to some of these, besides giving abstracts of the statistical part of the report. The work of the Department of Mines has been well done, notwithstanding certain hindrances, which are referred to in its pages; and credit is due for the results presented.

Three Years in the Klondike. By Jeremiah Lynch. London; Edward Arnold. New York; Longmans, Green & Company. Pages, 280; illustrated. Price, $5.

The author of this book went into the Klondike early in the season of 1898, when the first rush had scarcely subsided, and spent three years there, alternately as traveler, trader and miner. He had, therefore, full opportunities of seeing the country and its life from various points of view. He has utilized his observations in an entertaining book. It is not—and does not pretend to be—a scientific work, or technical in any sense. It gives, however, an excellent idea of conditions and ways of living in the Klondike at all seasons, and of the hardships which the pioneers had to undergo. These have been mitigated to a certain extent by five years of settlement and by the improvements in transportation and supply which have followed. They have not disappeared, since some hardship must always be endured in a winter climate as rigorous as that which prevails in the Yukon country. Nothing but gold—the prospect of wealth—could induce men to live in such a climate, and to combat the many difficulties which it entails. Mr. Lynch's narrative is plainly written, in a way which leads one to believe in its substantial truth. It reads well, and brings out many points which will interest the miner, as well as the casual reader. He has confidence in the future of the country, and believes that it will hold a large population for many years, in spite of the drawbacks of climate.

The mechanical execution of the book is excellent, and it is illustrated by many reproductions of photographs, which add to the clearness of the descriptions. There is also a map showing the relative position of the chief points in the Yukon and Alaska—clearly drawn and not overloaded with details.

The Mineral Industry in 1903. Volume XII. Founded by Richard P. Rothwell. Compiled, under special charge of D. H. Newland, by the Editorial Staff of THE ENGINEERING AND MINING JOURNAL. New York and London; THE ENGINEERING AND MINING JOURNAL. Pages, 528; illustrated. Price, $5.

The appearance of a new volume of 'The Mineral Industry' has become an event to mining men, who have grown accustomed to refer to its pages for the statistical information which all have to use so frequently. It has come to be a guide which is indispensable to every one interested in the great and basic industry from which its name is derived. So much must be said in recognition of the general merits of the series before taking up the new volume.

Perhaps the first point to be noticed is that the number of pages is less than in the preceding volume. There has not been time yet to go over the pages fully, but the first glance shows that this is the result rather of condensation than of omission. The important subjects—coal, iron and steel, gold and silver, lead, zinc, quicksilver—are all fully treated,

while the minor products have their appropriate space. The information is in compact form, and little or nothing has been omitted which would take from the completeness of the longer articles. Some of them, indeed, are more comprehensive than those on the respective subjects which appeared in former volumes. But the editors seem to have been relentless in cutting them down, to avoid any superfluous words. In this way the limitation of space has been rather of service than otherwise.

Of the statistical articles, it is impossible—and, indeed, it is unnecessary—to speak in detail. Here and there some point is found which calls for notice. Thus, the explanatory tables of lead production, which have been added to the first table, put in much clearer light than ever before the actual items of production and consumption of the metal in the United States, and the movement of foreign lead, which is so important a point in our trade. The supplementary notes on lead in the different States bring out some interesting points, with regard to the southeast Missouri district, and generally to the origin of our large production of the metal. The article on tin also gives some notes on the Alaskan discoveries, which express our knowledge of those possible future sources of supply up to the latest date. The tin industry has reached the point where new supplies are necessary, if it is to grow; but, unfortunately, the new supplies seem to be still mainly in expectation rather than in actual existence. In zinc, in addition to the production and markets for spelter, there are some interesting notes on the improvements in metallurgy in this and other countries, notes which ought to be studied, if our smelters intend to utilize the supplies of ore which are ready for them. The copper article also includes valuable notes on the progress of metallurgy by L. S. Austin, which have an important bearing on the production of this indispensable metal. Gold and silver ore treatment, especially in cyaniding, claim some space. In iron and steel there is little new, so far as metallurgy is concerned, a result largely due to the halt in progress which results partly from the great activity and intensive production in 1903, and partly also, we fear, from the enormous consolidations in the trade, which have, by reducing competition, done away with the pressing necessity for improvements in manufacture. Among the minor articles, we find some interesting notes, especially on aluminum, on the production of arsenic in the United States, on chrome ore—a product of growing importance—on manganese, and on phosphate rock.

We find in this volume, too, the important yearly reviews, which we have become accustomed to look for, by Professor Kemp on the Literature of Ore Deposits, by Professor Richards on Ore Dressing, and by Professor Hofman on Improvements in Lead Smelting. In the last-named article there is a special notice of two processes, which have aroused great hopes in Australia, though they are but little known as yet in this country—the Huntington-Heberlein and the Bradford-Carmichael processes—both of which are now under control in practice at Broken Hill and Port Pirie. It is not improbable that both will be introduced before long into American practice. As I said before, however, there is not the time or space here to go through all the separate articles. In fact, this is a book which cannot well be reviewed offhand. Only continual use will make its real merits fully apparent.

The papers on mining in the various States, as well as in Mexico and Australia, are good reading, and worth putting on record with the statistical articles which they supplement. I miss, however, the tables of exports and imports of foreign countries. Some of these were of little use, but others might have been given to advantage, at least in their leading items. This is a minor point, however, as the main part of the information is to be found in the separate articles.

Upon the whole, I find Volume XII fully up to the standard set by its predecessors, and worthy to take its place beside them, in the series which will, I hope, continue for many years to come. C. T.

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and that of book buyers, give the retail price? These notices do not supersede review in a subsequent issue of this JOURNAL.

Geological Survey of Canada. Catalogue of Canadian Birds, Part III. By John Macoun. Ottawa, Canada; Public Printer. Pages, 348.

Report of the Chief Inspector of Mines in India for the Year 1903. James Grundy, Chief Inspector. Calcutta, India; Government Printer. Pages, 40.

Inauguration of President Charles Sumner Howe, of the Case School of Applied Science. Cleveland, O.; published by the Case School. Pages, 64; illustrated.

Kanawha and New River Coalfields of West Virginia. By Neil Robinson. Charleston, W. Va.; Published by the Author. Pages, 24; with map and illustrations.

Die Darstellung des Zinks auf Elektrolytischens Wege. By Emil Günther. Halle-a.-S., Germany; Wilhelm Knapp. Pages, 244; illustrated. Price (in New York), $3.50.

Fourth Annual Report of the Inspector of Coal Mines of the State of Montana. 1904. Howard F. Welsh, Inspector. Helena, Montana; State Printer. Pages, 148; illustrated.

The Map of South Africa. 1905. London, England; published by *South Africa.* One sheet, 24 by 30 inches. Price (in New York), folded, with board cover, 35 cents; mounted on cloth, 90 cents.

Tenth Annual Report of the Boston Transit Commission. H. A. Carson, Chief Engineer; B. Leighton Bell, Secretary. Boston, Mass.; published by the Commission. Pages, 108; with maps and illustrations.

Eighteenth Annual Report of the Commissioner of Labor. 1903. *Cost of Living and Retail Prices of Food.* Carroll D. Wright, Commissioner. Washington; Government Printing Office. Pages, 866.

The Mineral Industry During 1903. *Volume XII.* Founded by the late Richard P. Rothwell. New York and London; THE ENGINEERING AND MINING JOURNAL. Pages, 528; illustrated. Price, $5.

Der Altjapanische Bergbau und Hüttenbetrieb, dargestellt auf Rollbildern. By Emil Treptow, Freiberg, Germany; Craz & Gerlach. Pages, 12; with illustrations and three large plates. Price (in New York), $1.

The Gold and Silver Mining and Milling Industry of the Guanajuato Consolidated Mining & Milling Company. Guanajuato, Mexico, and New York; published for the company. Pages, 96; with maps and illustrations. Price, $2.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Bismuth Ore in Mexico.

Sir—Noticing an inquiry about bismuth in THE ENGINEERING AND MINING JOURNAL, of December 1, I can say that I have found very fine specimens of bismuth on a property I have lately examined in the State of Durango, Mexico, and believe it might be included in your list of places where it is found. I cannot say whether or not it will ever be put among the places where mined, as the property has not yet been sufficiently developed.

J. WAYNE VON LEER.

New York, Dec. 7, 1904.

Change of Monetary System in Mexico.

Sir—For some time the Mexican government has been contemplating a change in its monetary system from the silver to the gold standard. The present rise in value of the Mexican dollar seems to indicate that the contemplated change to the gold standard is expected to take place in the near future. As is well known, Mexico has thoroughly investigated the monetary question, and the possible effect of a change to the gold standard on conditions in Mexico has been carefully studied by experts, until finally the decision has been reached that it will result for the benefit of the majority.

A great deal has been said regarding the unstable Mexican dollar, and, viewed from the point of outsiders, it is not desirable money, on account of its changing value as measured in the currency of gold countries. However, considering the dollar from a Mexican point of view—that is, its monetary use in Mexico—its value is fairly constant. The usual wages paid to unskilled Mexican laborers vary between $0.50 and $2 Mexican per day, equal to nearly half that in American currency, the rate depending principally on the locality. The lower wages are common in the agricultural districts, whereas the higher wages are paid to miners and laborers employed in and around metal mines, where they vary between $1 and $2 Mexican per day.

Most of the industries, agricultural, commercial or manufacturing, may be expected to be benefited by a change to a gold dollar having a constant value. Business transactions with foreign countries will then be far more secure than heretofore with the ever-changing value of the Mexican dollar. The general public in Mexico expects that when a change to the gold standard will be made it will be somewhat on the principle of the Philippine gold dollar, which has a value of 50c. American currency.

The object of this letter, however, is to refer to the silver mining industry of Mexico, and to point out the effect a change will have on the silver miner of Mexico.

At present the Mexican silver miner, selling ore to smelters or mills, is usually paid for the silver-gold content of his ore on a basis of the value of a kilogram, or an ounce troy of silver, or gold, as measured in Mexican currency. The custom of some of the ore-buyers, however, has been to settle for ore on a gold basis, paying for the silver, gold, or other metallic content of ore in United States

currency based on New York quotations on day of settlement. The miner receives pay for his ore in gold, which is usually exchanged into Mexican money at a point or two below the rate of exchange on New York, as quoted in the City of Mexico. Still, most of the ore, especially the low-grade milling ore, is sold at a stipulated price per kilogram of silver and gold, paying for the metal contents in Mexican money, no attention being paid either to the exchange rate or the price of fine silver in New York and London. This system of paying for ore works without a hitch as long as the rate of exchange on New York does not materially differ from the true rate of exchange as calculated against the value of silver in New York or London; but as at present the true rate of exchange is from 6 to 12 points higher than exchange as quoted in the City of Mexico, mills purchasing ore and paying for the silver-gold contents in Mexican money, find that on selling their bullion and settling in gold on New York quotations, and then exchanging into Mexican money, they receive from 2 to 4 per cent less for their product than they paid to the miner.

If bullion is sold to the Mexican mints, receiving pay in Mexican dollars, the mill receives a certain price for the silver contained in the bullion, irrespective of the rate of exchange or the price of silver. The mills then take no chances on the price of silver changing before the bullion reaches its destination. However, most silver bullion produced, as well as all of the silver produced, is sold either to refiners in the United States or in Europe, settling for the product in gold, which is then exchanged into Mexican currency.

Roughly speaking, mills in Mexico at present purchasing silver ores and paying for the silver contained as usual, then selling their product to outside buyers, and receiving pay for the silver in United States currency as per New York quotations, find a difference, in the value of silver as purchased and paid for, of nearly 6 per cent, which would naturally reduce their income in the same proportion. In order to avoid this loss, they must change their system of transacting business. Perhaps the easiest way to accomplish this would be to pay for the silver in gold, paying New York prices of silver on date of settlement.

So far as payments in Mexico are concerned, the interests of the miner, or the reduction works, are not influenced by any variations in the price of silver as measured in gold. The employees are paid with the Mexican dollar. With the exception of machinery or supplies purchased in foreign countries, which are paid for in gold, the profit derived from the working of a mine may then be measured by the assay value in ounces of the ore produced.

To illustrate the effect a change from the present silver to the gold standard will have on the silver mining industry of Mexico, the following must be considered:

1. Nearly all labor, native Mexican, as well as foreign, is paid for in Mexican currency, a dollar having an unvarying value in Mexico.

2. The Mexican mints, purchasing silver bullion for coinage, pay for silver at the rate of $40.915 Mexican currency per kilogram. Thus, the mills in Guanacevi paying for silver in ore purchased, pay at the rate of $34.72 to $34.75 Mexican per kilogram of silver, which is equal to about $1.08 Mexican per ounce troy. The difference in price of silver as paid for by mills in that camp, as compared with what is paid by the mints, is about 6 per cent of the gross value of silver, which covers all expenses attached to the disposal of the product, such as the various taxes collected by the Federal as well as State governments, and the expenses incurred in disposing of the bullion—shipping expenses, charges and profits of refiners and possible middlemen. The miner selling ore is paid for 75 per cent of the silver, as determined by assay, at the rate of $34.72 per kilogram (equal to $1.08 an ounce troy); the mill, after deducting $15 per ton for treatment charges, pays the balance due the miner, who must, with this, pay freight, as well as mining costs. Under the above conditions the miner sending ore to the mill containing 35 oz. silver per ton, freight to mill being $2, treatment charges $15, and cost of mining $8 per ton, would find value of a ton of ore as follows: 75 per cent of silver contents, 26.25 oz., at $1.08, $28.35; mining, freight and treatment costs, $25; net value of ton of ore, $3.35.

Now supposing the monetary system is to be changed as suggested, the future gold dollar having a fixed value of 50c. United States money, mills would then pay in gold for silver in ore, on the basis of New York quotations on day of settlement, minus about 16 per cent. Taking the value of an ounce of silver in New York at 59⅛c. (day of writing this), exchange on New York being quoted at a premium of 100 points, then the miner selling ore would receive for the same as follows: 26.25 oz. silver at 84 per cent of 59⅛c. would be $13.04 United States; mining, freight and treatment, $25 Mexican, or $12.50 United States; net value of ore to miner in United States currency, $0.54, or in Mexican currency, $1.08.

The miner would receive $1.08 Mexican, against $3.35 under the old system for his ton of ore, after paying all expenses. Should the price of silver advance, the miner will receive the benefit; but should silver drop, he would get still less for his ore. At present the actual difference in the value of silver as compared to the old system is hardly sufficient to justify a general attempt to reduce wages paid Mexican workmen, consequently the actual expense of mining in the future may be expected to be equal to that in the past, with the difference that in the future the miner will be paid with a gold dollar, whereas in the past the silver dollar was the standard.

Changing to the gold standard will place the Mexican miner on the same basis as the American miner, who, when silver brings a fair price, may count on increased profits; whereas when silver drops, a corresponding loss will result. The Mexican miner will in the future be a speculator in silver, and when silver takes sudden drops, certain of the low-grade mines will be forced to shut down temporarily; though as soon as silver advances they will be started again.

E. S.

Guanajuato, Mex., Dec. 1, 1904.

MOSS AGATE IN THE BLACK HILLS.—Large masses of moss agate have been found in abundance in the foot range of the Black Hills, in the Hartville district, about 130 miles north of Cheyenne, Wyoming. The material occurs in lenses, or interrupted veins, from 5 to 6 or more inches in thickness, and varies in width from 2 to 3 feet. More than seven tons were mined during 1903 and sent to Germany for cutting. The demand for these stones for cutting and setting seems to come almost entirely from Germany, as they are all sent there.

ABSTRACTS OF OFFICIAL REPORTS.

Hall Mining & Smelting Company, Ltd.

This company's property, at Nelson, B. C., consists of one mine, the Silver King, leased to tributors, a fourth interest in another, the Emma, and a smelter for treating either lead or copper ores, but depending for most of its supply upon custom ores from Hunter V, B. C. Standard, and other mines. The report covers the year ending June 30, 1904.

Development in the Silver King mine is at a standstill; the single tributor, during the year, extracted 4,341 tons averaging 21.4 oz. silver and 3.66 per cent copper. The Emma mine, furnishing a much needed fluxing ore, was more actively worked, 27,975 tons having been produced during the year, of which 9,331 tons was treated at the company's smelter and the rest sold.

The smelter, comprising two blast-furnaces and three hand roasters, turned out 6,155 tons of lead bullion, carrying 1,096,415 oz. silver and 9,201 oz. gold; also 140 tons of copper matte containing 41,294 oz. silver, 130 oz. gold, and 130,800 lb. copper, the whole output having a gross value of about $1,000,000. Several improvements have been added to the plant in anticipation of stimulated mining, following the promised bounty on lead.

The profit and loss account, not distinguishing between the sources of sundry receipts, may be expressed thus, in sterling:

Royalty	£805
Net value of product	215,755
Sundry	1,163
Total receipts	£217,723
Mine expenses	£447
Purchase of ores	163,912
Smelter expenses	43,829
General expenses	1,787
Maintenance and depreciation	4,562
Interest, etc.	1,489
Total expenses	£216,026
Balance, gain	£1,697

The fixed liabilities of the company consist of £325,000 capital stock, of which £275,000 has been issued, and a £50,000 debenture loan, at 6 per cent interest, of which £24,560 has been placed, secured by a first mortgage upon mines, land and plant, and to be retired at 105 per cent by the operation of a redemption fund. Further liabilities amount to £46,884, most of which is secured by a charge on all stocks of supplies and products.

De Beers Consolidated Mines, Ltd.

The report of the directors of this company covers the year ending June 30, 1904. The general manager's report, the most important subject in which is the development of the newest mine, the Dutoitspan, has not been published as yet.

A recent addition to the company's equipment is a dynamite factory, at Somerset West, having an annual capacity of 300,000 cases. The success of this enterprise has already caused a general reduction in the price of explosives.

As a more economical source of fuel, the company has arranged with the Transvaal Commissioner of Railways to bear the expense—estimated at £788,464—of constructing a railroad from Klerksdorp, Transvaal, to Fourteen Streams, Cape Colony, connecting, by a branch line at Eastleigh, with the collieries at Vierfontein, in which the company owns a considerable interest. The line will be finished within two years.

The company's capital stock amounted to £4,500,000, and bonded liabilities to £4,241,245.

A semi-annual dividend of £1,025,000 was declared in June, being equivalent to 22.8 per cent, and having an unappropriated balance of £837,961, after allowing for various reserves and meeting all outstanding obligations.

Without distinguishing the expenses as attributed to the individual mines, De Beers and Kimberley, Premier, Bultfontein and Dutoitspan, the profit and loss account for the year may be stated thus:

From sale of diamonds	£4,918,568
Dividends, rents, etc	107,987
Total receipts	£5,026,555
Mining	£987,335
Milling	599,466
Dynamite factory	127,189
Decrease in stock of "blue ground"	24,019
Real estate	21,761
Office expenses, etc	152,767
Interest	307,738
Redemptions	276,200
Depreciation	463,883
Total expenses	£2,960,358
Balance available for dividends	£2,066,197

An item in the expense account not often seen in reports of our own companies, at least not in figures of such magnitude, is "donations to public institutions and relief," £38,939. The reserve fund amounts to £1,178,000, invested in British consols.

The average yield per load for the De Beers and Kimberley mines was 0.54 carat, the value per carat being 48s. 11.8d., and per load, 26s. 7.1d. For the Premier mine, at Wesselton, the average yield was 0.28 carat, the average value per carat being 34s. 10.45d., and per load, 9s. 10.6d. At the Bultfontein an average yield of 0.29 carat per load was reported, the average values being 29s. 7.76d. per carat, and 8s. 6.5d. per load. The stock of blue ground and lumps on the floors at the close of the year was as follows: De Beers and Kimberley, 2,213,499 loads; Wesselton, 1,356,260 loads; Bultfontein, 397,503 loads; Dutoitspan, 15,555 loads.

Nothing is said in the report about the new discoveries of diamonds in the Transvaal. It is not believed, however, that these will materially affect the control of the diamond market, which this great company has held for so long.

Consolidated Gold Fields of South Africa, Ltd.

This report, covering the year ending June 30, 1904, describes *seriatim* the condition and progress of the several mines in whose management the company has a controlling interest. The three heaviest producers are Simmer & Jack, Robinson Deep and Knights Deep, all on the Witwatersrand; six other mines on the Rand are described as being "in an advanced stage of development," and eight are mentioned on which the development varies from a bore hole to a steel headgear and 50-stamp mill. Five Rhodesian mines and an interest in the New Gold Coast Agency complete the list.

Development in the three large mines is progressing with all possible speed, exposing large reserves with an average contents of 10 dwt.

The milling returns at these mines may be of interest:

	Simmer & Jack.	Robinson Deep.	Knights Deep.
Days milling	357.2	341.4	347.6
Stamps running	165.0	180.0	100.0
Tons hoisted	396,635.0	379,842.0	228,864.0
Percentage of waste	19.8	20.1	18.4
Tons crushed	318,692.0	303,621.0	186,844.0
Tons per stamp per day	5.4	4.9	5.4
Yield from battery, oz	72,581.8	104,973.9	45,890.3
Yield from sand, oz	44,565.5	46,274.9	21,833.7
Yield from slime, etc	5,451.9	9,803.3	1,904.0
Total yield, oz	122,599.2	161,052.1	69,628.0

The monthly output of all the company's properties amounts to more than 312,000 ounces.

The capital stock comprises £1,250,000 preferred and £2,000,000 common, on which no dividends were paid during the year. Total receipts were £467,188; total expenses, £83,962; net income, £383,226, out of which a preferred dividend, income tax and French Government duties were paid, leaving a balance of £2,239,814.

The report devotes much space to discussion of the labor problem, to the necessity of introducing Chinese labor, and to the gratifying results already obtained. At present about 13,100 Chinese are employed.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc. Preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Ammonium Bichromate.—Will you kindly tell me what are the uses, commercially, of ammonium bichromate, and if there is any considerable consumption of this salt in the United States; also at approximately what price in quantity at the factory?—R. F.

Answer.—Unfortunately, this chemical salt is not known as an article of commerce in this country, though limited quantities are made in Germany, we understand, and marketed at about 9c. per lb. for the ordinary grade, f. o. b. works, and 29c. per lb. for chemically pure crystals. What the uses are cannot be learned here, as the salt is probably employed for special purposes, offering practically no competition for other compounds.

Cement for Stone Tanks.—We would like your advice, or reference to someone who can advise us, of caulking material to be used in caulking a stone tank which is intermittently subjected to heat of 200° and to the normal temperature of the atmosphere.

The stone when heated expands slightly, and the caulking material we have been using is forced to occupy a smaller space and gets hard. When the tank cools off the stone contracts, and the caulking material refuses to expand and fill the greater space made between two stones.

Any information you can give us on this subject will be very much appreciated.—P. S.

Answer.—We would suggest that you use a mixture of coal tar or asphaltum with fine sand or cement. We are advised by an eminent authority on cement that you will probably find this satisfactory; though it may be necessary to experiment, in varying the proportions of the respective ingredients, before you succeed in finding the most suitable compound. We also advise that you consult the New York Testing Laboratory, at Long Island City, N. Y.

Lead Supplies for the Far East.—Can you tell me what the demand for lead is in China and Japan, and from what sources it is supplied? Also what price the metal commands in those countries? The trade of India might also be worth some consideration.—B. C.

Answer.—The demand for lead in China and Japan is considerable, though, in the case of the first named country, it is difficult to reduce it to figures with any approach to exactness. The only guide which we have, with regard to China, is the report of the Maritime Customs, which gives the imports. According to this statement, the imports of lead, in all forms, including pig lead, and also sheet pipe, and other manufactures, in 1902, were about 8,000 tons; and this does not vary far from the average for several years past, so that the purchases of China abroad may be fairly estimated at about that quantity. The actual consumption of lead in China is probably much greater than that. There is a certain production of lead from mines in the country, but it is impossible to ascertain the quantity, in the absence of all official returns of any kind. Moreover, not very much of a definite character is known about these Chinese lead mines, but the only guide which we have—and that is rather an uncertain one—is the assumption that the population of China must necessarily consume much more lead than is imported. For Japan, the figures are more definite. In the same year the mines of Japan produced 3,684 tons of lead, while the imports of pig lead were about 6,000 tons. The consumption in an ordinary year, therefore, was approximately 10,000 tons. In 1903, and during the current year, the consumption has probably exceeded this quantity, owing to the demand for lead in the manufacture of war material. India produces practically no lead. The imports are about 6,000 tons yearly of pig lead, with a considerable additional quantity in manufactures.

The demand for lead from abroad in China and Japan, and also to a considerable extent in India, has been supplied heretofore from the Broken Hill mines in Australia. The production of lead in Australia is not far from 90,000 tons yearly, and of this about 30 per cent has been exported to eastern countries. This country would supply, or more than supply, the imports in the three countries noted above. Australia is well situated to command the eastern markets, owing to the fact that it is in much closer proximity to them than any other lead-producing country. Moreover, there are regular lines of steamers plying between Australian ports, and those of China and Japan, so that transportation is always available. Probably it would be difficult for any other country to compete with the Australian mines for this trade, owing to the differences of freight rates, and the command already obtained of the market, which amounts to a great deal in these conservative eastern countries.

The price of lead in the Chinese and Japanese markets is practically based upon the London quotations, plus freights, commissions, duties, and other charges. The freight rates naturally play an important part in fixing the price.

PURIFICATION OF ACETYLENE.—An obstacle to the extensive use of acetylene as an illuminant is found in the difficulty of purifying it. The trouble is that with the gas certain sulphides and phosphides are evolved from the calcium carbide. Thus far use has been made of calcium hypochlorite (so-called chloride of lime) as an oxidizing purifier. Some objection has been made to the employment of this agent—as it might possibly cause explosion with some ammonia present, by the formation of the fulminating nitrogen chlorides. But Prof. Maquenne points out, in the *Moniteur Industriel*, that this source of danger may be removed by washing acetylene more carefully with water to remove the ammonia, previous to purification by hypochlorites.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

DUTY ON STEEL INGOTS.—The merchandise in question was returned by the appraiser as combined iron and steel, and was classified as manufactures of metal under paragraph 193, Tariff Act of 1897. The evidence showed it to consist of hard steel and mild steel welded together. The contention of the importers that it should have been classified under paragraph 135 as steel ingots is sustained, and the appraiser's decision reversed.—Appeal of Stone & Downer Company from Collector of Customs at Boston; Board of General Appraisers.

DUTY ON IRON CASTINGS.—In this case the merchandise was classified as manufactures of metal under paragraph 193, Tariff Act of 1897, and was claimed by the importers to be dutiable as iron castings under paragraph 148. The report of the appraisers showed the articles to be castings which had had work done upon them in the machine shop. The report is, therefore, overruled.—Appeal of W. H. Allison from Collector of Customs at Detroit; Board of General Appraisers.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending November 29, 1904.

776,159. STAMP-MILL.—Donald I. Whiteside, San Francisco, Cal. The combination with a reciprocating stamp or like stem, of a cylinder axially in line therewith and having a valve-face provided with inlet and exhaust ports, a piston fitting the cylinder, to which piston, the stamp-stem is secured, a valve-chamber, a valve means for reciprocating the valve, rotatable means for imparting a reciprocatory movement to the valve, said valve having a recess in its lower face and a curved port extending around said recess and adapted to bridge the space between the first-named ports, said first-named ports connecting above and below the piston and one of said ports entering the cylinder near the middle thereof to provide a relative large chamber into which expansion from the opposite end of the cylinder may take place, said valve adapted to first admit the elastic medium to the cylinder to impel the piston in one direction, then a portion transferred to the opposite end of the cylinder and the portion remaining in the first-named portion of the cylinder exhausted to enable the transferred portion to return the cylinder to its first position.

776,186. CALCINING-FURNACE.—William A. Köneman, Chicago, Ill. In apparatus for calcining gypsum, or the like, the combination of a furnace, a calcining-chamber, a plurality of heat-radiating flues communicating at one end with the said furnace, to conduct the hot products of combustion therefrom, and crossing said chamber, a series of vapor-abstracting conduits crossing and open to said chamber, and means for feeding the material to be calcined against and past the sides of said flues and conduits, the said flues being all closed to said calcining-chamber, whereby the said material is kept from physical contact with the hot products of combustion from the furnace during the entire calcining operation.

776,189. CONCENTRATOR.—Frederick T. Le Strange, Syracuse, N. Y. A concentrator comprising front and rear foundations, plates mounted on the rear foundation, an inclined concentrating-table provided under its elevated end with a transverse bolster having a convex bottom seated in correspondingly shaped recesses in said plates, metallic sockets mounted on the front foundation, a cross-bar secured to the under side of the lower end of the table and provided with screw-threaded vertical holes, screws passing through said holes and stepped in said sockets and operative for adjusting the table to different degrees of inclination, the top of the table provided with vents for escape of water, a cloth cover spread over said top, a supply-sluice extending along the upper end of the table, a conductor leading from said sluice to the upper end of the table and of gradually increasing width and entirely open across its wider end, main slime-distributers and auxiliary slime-distributers fastened to said conductor, means controlling the discharge from the supply-sluice to the conductor, a universally movable flushing device, a concentrate-box and a waste-sluice under the lower end of the table, and a gate connected adjustably to said end of the table to communicate with either the said box or sluice.

776,221. DRILL OR PUMP-ROD EXTRACTOR.—Ezra F. Day, Risingsun, Ohio. A tool of the class described comprising a body or hook having an approximately circular recess, opposing chisel-shaped points, and an entrance to said recess between said chisel-shaped points, said entrance being of less width than the diameter of the recess; and a stock connected with said hook at a distance form the heel thereof.

776,230. HOISTING AND CONVEYING APPARATUS.—Howard D. Ga Nung, Cleveland, Ohio. In a hoisting and conveying apparatus, the combination of a trestle of the cantilever type, a stationary engine, a carriage arranged to travel on said trestle, a cable-wheel journaled in said carriage, an endless rope passing over said cable-wheel and around the driving-wheel of said engine, gripping devices arranged on the periphery of said wheel and adapted to engage said rope and prevent said rope from passing around said wheel when said wheel is stationary, means for preventing the rotation of said cable-wheel, load-handling mechanism arranged in said carriage, and means for operatively connecting said load-handling mechanism with said cable-wheel.

776,318. DUPLEX STEAM-PUMP.—Charles A. Goyne, Ashland, Pa., assignor of three-fourths to Goyne Steam Pump Company, Ashland, Pa. In combination with a cylinder provided with a main valve carrying a cut-off valve, means for operating said main valve without affecting the time of action of its cut-off valve, and means, independent of the main-valve-operating means, for operating said cut-off valve to effect the cut-off at predetermined intervals independently of the movement and irrespective of the position of said main valve.

776,365. COMPOSITE FUEL AND THE ART OF MAKING SAME.—Mark R. Spelman, New York, N. Y. A composite fuel composed of carbonaceous solid matter ground to a fine flour, an inflammable semi-liquid in which such carbonaceous material may be so ground, and an inflammable liquid thinning the compound and adapting it to be pumped through pipes and to be burned in the form of a spray.

776,373. ARTIFICIAL BLOCK FUEL.—Michael Andes, Wilkes-Barre, Pa. An artificial block fuel composed of about four parts of anthracite coal, one part of stringy inflammable binding material capable of shrinking when drying out, one part of cement to secure the stringy material to the coal particles and one part of bituminous-coal dust, the ingredients being mixed.

776,391. COUPLING FOR DRILLS.—Charles H. Giese, Toronto, Kan. A device for connecting a drill with its rod, consisting of an adjustably mounted member, means for fixing said member, teeth on one end of the said member, a movable member, means for locking the movable member against independent rotation, teeth on the movable member which engage the teeth of the other member, the teeth of the members overlapping the joint between the rod and drill, and a lock-nut for holding the teeth of the two members into engagement with each other.

776,414. ORE STAMP-MILL.—Peter N. Nissen, Prescott, Ariz. In a stamp-mill, the combination of a mortar, provided with an anvil projecting upwardly from the bottom thereof, a removable interior lining therein having a horizontal inwardly-projecting flange surrounding said anvil, and a removable die within said mortar resting upon the anvil and overlapping said horizontal flange of the lining, whereby said lining is held in position.

776,424. PROCESS OF TREATING GOLD AND SILVER ORES.—Charles H. Rider, St. Louis, Mo. A herein-described process of treating gold- and silver-bearing ores, which consists in placing a charge of approximately 500 lb. of crushed ore in each of the four receptacles, adding in each receptacle a solution composed of 100 gal. of water, 3 to 5 gal. commercial sulphuric acid, and 15 to 20 gal. of commercial nitric acid, and after the silver is dissolved removing the resultant solution to new receptacles, adding the fresh solution to the undissolved ore in the first receptacle, said solution comprising 40 gal. of water, 5 gal. of nitric acid, and 10 gal. of hydrochloric acid, thus dissolving the gold in the first receptacle, then combining the two solutions and precipitating the silver.

776,430. ARTIFICIAL BUILDING MATERIAL.—Adolphe Seigle, Lyon-Monplaisir, France. A process for manufacturing artificial stones consisting in taking dry trituration of determined quantities of lime and of calcined calamine or oxide of zinc in powder form, and incorporating this mixture in a large quantity of silicious matter, subjecting the mass thus obtained to a slow and methodical humectation through a spread solution of chloride of calcium and mixing the mass together, until a sufficiently plastic paste is obtained, then casting into molds and finally removing it from the molds and subjecting it to the action of steam under pressure to harden the same.

776,460. MANUFACTURE OF ARTIFICIAL GRANITE.—Louis A. Garchey, Paris, France. A process which consists in applying a refractory material to the inner surface of a suitable mold, heating the latter, mixing a colored oxide with the glass, then melting the glass and introducing the same when melted into the heated mold, introducing into said mold powdered mica while the melted glass is being introduced thereinto, and finally in devitrifying the glass by slowly allowing the mold to cool.

776,472. LEVIGATING-MILL.—John W. H. James, Philadelphia, Pa. The combination, in a levigating-mill, of the grinding-tub and its fixed stone, having a downwardly delivering central discharge-orifice, a valve for closing the outlet therefrom, the movable stones, the rotating shaft carrying the same, a sleeve engaging said shaft so as to be capable of lifting the same, and mechanism above the tub for raising and lowering said sleeve.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending November 19, 1904.

20,419 of 1903. OIL CONCENTRATION.—Sulman & Ricard, London. In separating minerals from gangue by oil concentration, introducing the oil in the form of a vapor mixed with jets of air.

23,299 of 1903. X-RAYS FOR REFINING OF METALS.—J. T. Fitzmaurice, Brighton. The use of *x*-rays for improving the quality of metal while in the molten state.

23,457 of 1903. ANNEALING METALS.—J. S. L. Alexander and A. Shiels, London. The use of a bath of molten aluminum as an annealing agent for metals.

23,550 of 1903. IRON OXIDE PIGMENT.—H. W. Hemingway, London. Improved roasting chambers for producin oxide of iron coloring matters from sulphate.

2,655 of 1904. TREATING SULPHATE OF ALUMINA.—L. R. Keogh and B. Broughton, Hamilton, Ontario, Canada. Treating sulphate of alumina with salt and fuel, so producing alumina, sulphate of soda, and hydrochloric acid.

4,384 of 1904. MELTING FURNACE.—H. J. J. Charlier, Philadelphia, Pennsylvania, U. S. A. A melting furnace mounted on trunnions through which the blast enters, and revolving so that the charge and discharge may be made through the same orifice.

7,805 of 1904. TUBE MILL.—J. Wells and J. Jackson. Northfleet. A tube mill for grinding cement, etc. having the lining made with circular grooves in each of which moves a grinding disk.

13,609 of 1904. COAL CUTTER.—O. Hughes and J. Berry, Wigan. In coal cutters that are mounted on vertical columns, fixing the columns on a carriage running on rails, so as to facilitate moving the cutter.

17,735 of 1904. CENTRIFUGAL GRINDER.—E. C. Griffin, West Newton, Massachusetts, U. S. A. Detailed improvements in the inventor's centrifugal grinding machine.

19,140 of 1904. CLASSIFIER.—E. J. Swyny and L. G. Plucknett, Sydney, New South Wales, Australia. Improvements in the method of introducing the currents of water in classifiers.

20,529 of 1904. STAMP MILL FEEDER.—H. M. Hunter, Johannesburg. Improved automatic ore feeder for stamp mills.

20,797 of 1904. PRODUCING OXIDES.—L. F. Huguenot, Paris, France. Improved apparatus for producing metallic oxides by burning the finely divided metal in the form of a spray.

SPECIAL CORRESPONDENCE

San Francisco. Dec. 7.

Among recent extensive deals in lands for gold dredging purposes is that completed last week by John Martin, Eugene de Sabla and associates, of this city, by which they secured possession of 1,200 acres along the Yuba river, a few miles north of Marysville. The land has been already examined and proved valuable for the desired purpose. It is stated that two dredges have been contracted for and others are contemplated. The property was owned by R. D. Cranston and others.

Boring has also begun on the Colmena Colony tract of 3,100 acres, half way between Marysville and Wheatland, to determine its value for dredging. This tract is somewhat removed from the known dredge districts of Yuba county, and the result of the prospecting work will be looked forward to with interest.

The Folsom Development Co. has deeded to J. Ogden Armour, of Chicago, the property known as the Natoma vineyard, near Folsom, as security for advances made to the company, of which he is a member. The Development company had an option on the whole 4,000 acres at one time, but this has been so modified that the vineyard proper is no longer included and will not therefore be utilized. The lands to be dredged are those which surround the vineyard.

Many purchases of possible dredging land are being made in several counties of the State. Large tracts are secured where possible, and ranch and orchard owners are getting very high prices for these lands. Even the lands near Marysville, practically rendered useless years ago by the overflow of hydraulic mining débris, are now being sold at much higher prices than they were before the mining débris injured them.

Annual assessment work to hold unpatented claims released a large amount of money in the months of November and December all over the country, and gives employment to numbers of men for a time. In California there are some thousands of claims thus held from year to year without sufficient development work being done upon them to prove their worth. The hundred dollars annual expenditure required by the law does little or nothing toward proving up a mining claim, yet any one of these claims thus held by possessory title might prove to be a profitable mine if developed sufficiently. Where many unpatented claims are held by an individual the annual assessment sometimes amounts to a considerable sum. There is within the writer's acquaintance one gentleman of this city whose expenditure for assessment work this fall has aggregated the sum of $70,000 for mines in the State of California. In another instance a mining company in Northern Butte and Plumas counties is now doing assessment work in nearly 800 placer claims which were either located or purchased along the right of way of a proposed railroad.

The suit of the Lightner Mining Co. against the Utica Mining Co., to recover $150,000 for trespass, which has been going on since November 21, was decided on December 6 in favor of the Lightner company, the damages awarded by the jury being $54,000. These two properties are the most important at Angels, Calaveras county, the Utica being the most productive gold mine in the State. The suit was brought some time ago, the allegations being that the Utica had taken ore from the Lightner ground. This fact was not denied, but there was a difference of opinion as to value of the ore. This the jury has now determined.

J. C. Wood has filed a foreclosure suit against the Little Butte Mining & Milling Co., of Randsburg, Kern county. It is alleged that there is $7,000 and interest from September, 1900, on certain promissory notes.

The Santa Maria oil field in Santa Barbara county has been producing, and is outstripping many of the older fields at present. The greatest "gusher" in the history of Santa Maria was struck a few days since on the Hartwell ranch, near Orcutt, in the center of the oil territory. It flowed 15,000 bbl. a day until brought under control, and is expected to yield regularly from 800 to 1,200 bbl. daily. It is owned by the Union Oil Co. Well No. 21 of the Western Union Oil Co., in the northern part of the county near the line which divides the Careaga and Harris ranches, has been flowing 2,400 bbl. a day since pipe connection was made with the tank. This is expected to be the most productive well in the county, and it is thought the regular flow will be about 1,500 bbl. a day. This will prove about a mile of territory between itself and a group of wells already down. The well did not come in as a gusher, notwithstanding its heavy flow. Near by are two wells of the Graciosa company, one of which is flowing 400 bbl. daily of a high-gravity oil. Another well in the Lompoc region is that of the Lompoc Oil Developing Co., where it was necessary to drill 3,640 ft. —the deepest in the State. There have been many difficulties, but it is expected that this well will be a large producer. There are now from 20 to 25 producing wells in Santa Maria district, and more are being gradually brought in.

Blue mountain is the section of Southern California at present attracting considerable attention. A number of claims have been staked, some of them twice over. The lode thus far found crosses the county line between Riverside and San Bernardino counties, so that each county has some of the claims located. Thus far little development has been done, but ore assays show values of from $8 to $65 per ton. The discovery on Blue mountain has already led to renewed search on the other mountains in that section, and locations have been made on Rattlesnake mountain, between Colton and the county line. A number of prospectors are now searching the region.

The rains have held off much later than usual this year, and since the heavy ones in the month of September, scarcely any worth mentioning has fallen, and yet the first week of December has passed. The placer and hydraulic miners have fixed up their sluices, reservoirs, pipes and giants, and are now awaiting the rain to set the streams flowing freely. The quartz miners, too, are anxious for a more abundant water supply. Since the general introduction of electric power lines throughout many of the mining sections of the State the quartz men are not so dependent on water power as was formerly the case, there generally being enough for the power-plants even late in the fall. An abundant water supply always has a great influence on the output of gold in California, where for six or seven months of the year no rain is even expected. If it does not come freely in the remaining months of the year the State suffers a loss of one or two million dollars in annual gold yield.

CHAS G. YALE.

Denver. Dec. 10.

The mills at Ouray have been placed on an eight-hour basis. There will not be any material difference between the wage scale and that established by the Telluride operators.

The Victor Fuel Co., of Colorado, has filed a suit against the United Mine Workers of America for $491,000 damages alleged to have been sustained during the late strike.

The Western Federation of Miners will not consolidate with the American Federation of Labor. An important meeting of the executive board of the former organization was held here during the past week, and it was there decided to carry the case of the owners of the Center Star Mining Co. against the miners' union at Rossland, B. C., to the highest Canadian court.

A meeting of prominent mining men was held this week as a result of the action of the American Mining Congress, at Portland, Ore., in naming this city as its permanent headquarters, with the object of influencing the federal government to establish a Department of Mining. A number of resolutions leading to that end were passed.

On December 8 a meeting of the creditors of the General Metals Co. was held at Colorado Springs, and Mr. Duncan Chisholm, senior member of the firm of Chisholm, Matthew & Co., was elected trustee. He will give bond to the amount of $100,000, and as soon as this is done the United States marshal, in whose charge the property has been for some time, will turn the property over to him. It is stated that the liabilities will aggregate about $700,000, while the assets, among which the Telluride Reduction Works, at Colorado City, is the chief, are estimated at about double that amount.

The suit of the minority stockholders of the Findley Gold Mining Co. against that company and the Valley City Gold Mining Co., brought to prevent a consolidation of these two companies, has been dismissed. The referees appointed by the court rendered a report favorable to consolidation. This will be on a basis of $1,250,000. The Findley stockholders will receive two shares of stock for each one they have, and the Shurtloff owners 12½ shares for each one held, the latter having been capitalized for $50,000.

A recommendation has been submitted to Congress by the Secretary of the Treasury for an increase of $143,600 in the appropriation for the mint in this city, in order to fully equip it before July 1, 1905.

The plans for the improvements of the Colorado Fuel & Iron Co. are being perfected, and $1,000,000 will at once be expended in completing the equipment of the tin-plate mill and the merchant mill. This amount is part of the $8,000,000 appropriation under the recent reorganization scheme.

One of the most important leases given by the executors of the Stratton estate was granted this week to W. G. Rice, R. P. Russell, et al., on a large block of ground covering the Badger Boy, Pride of the Rockies and other good territory. It is reported that the lessees will erect a cyanide plant for the treatment of their low-grade ores.

The report of the directors of the Stratton's Independence, Ltd., for the year ending June 30, 1904, shows that during the year a loss was sustained of $65,280, but since the leasing system was adopted, a much more favorable showing is made, a profit of $16,685 being made in August, and $38,105 in September.

The Portland Gold Mining Co. has decided to lease the enormous dump at its No. 1 shaft to the highest bidder, on a royalty basis. It is estimated that there are about 1,500,000 tons of ore in the dump, containing an average value of about $3.50 per ton. A bond of $10,000 will be required, which is necessary chiefly on account of possible damage to the Midland Terminal railroad.

Duluth. Dec. 12.

Vermillion range shipments have been as follows, in gross tons: Minnesota, 88,000; Chandler, 422,000; Pioneer, 506,000; Zenith, 87,000; Sibley, 123,000; Savoy, 75,000; total, 300,000 tons. Last year this range shipped a total of 1,677,000, and the year before better than 2,000,000. All these mines are properties of the United States Steel Corporation. Minnesota mine fell off this year materially, as it was not operated at all, but shipped a large part of the stockpile that had been accumulated during previous activity.

The Oliver Iron Mining Co.'s shipments from the Menominee range have been as follows for the season: Iron River, 17,238; Dober, 64,205; Mansfield, 57,609; Aragon, 374,915; Chapin, 539,900. The same company's shipments from the Marquette range have been: Lake Superior, 587,438; Regent, 303,146; Hartford, 179,740; Moore, 25,828; Volunteer, 71,870. From the Gogebic range the company's shipments have been: Norrie and Pabst, 617,764; Aurora, 212,912; Tilden, 205,001; Atlantic, 77,234. The Menominee range shipments do not include half of Pewabic, which the company owns, but those of the Marquette include a quarter of Regent and Lake Superior, which the company does not own.

Shipments for the year from many of the Mesabi mines are as follows: Fayal, 975,000 tons; Stevenson, 1,650,000; Mountain Iron, 1,130,000; Burt, 1,175,000; Biwabik, 653,000; Mahoning, 707,000; Adams, 956,000; Spruce, 595,000; Sellers, 307,000; Shenango, 52,000; St. Clair, 27,000; Day, 84,000; Glen, 280,000; Hull, 50,500; Higgins, 35,500; Rust, 211,000; Jordan, 180,000; Genoa, 244,000; Cass, 27,000; Franklin, 64,000; Petit, 27,000; Bessemer, 86,000; La Belle 90,000; Duluth, 155,000. Jones & Laughlin's shipments off the Mesabi range have been: Lincoln, 154,000; Grant, 59,000.

Pickands, Mather & Co. and Lackawanna Steel Co. shipments off the Mesabi range have been: Minorca, 122,000; Corsica, 30,000; Elba, 127,000; Malta, 67,000; Sparta, 60,000; Albany, 152,000; Utica, 120,000; Troy, 12,700; off the Gogebic, Mikado, 25,000; Cary, 62,000; off the Menominee range, Hemlock, 135,000; Baltic, 152,000; Vivian, 80,000. Corrigan, McKinney & Co.'s shipments off the Mesabi have been: Stevenson, 1,650,000; Jordan, 180,000; off the Crystal Falls district, 510,000 tons.

The loss by fire and explosion at the hydraulic works of the Chapin mine last week was not so severe as was made out by telegraphic reports at the time. It will not exceed $10,000 to $12,000. The mine is not seriously incommoded and is running along steadily. This is the second time an explosion has caused fire in the plant, and it seems very hard to guard against its recurrence.

The United States Steel Corporation's option on the Arcturus mine has now been closed, and the property is taken over under lease. This calls for a royalty of 25c. a ton on all ore shipped, but not necessarily on all mined, for this ore must be washed and dressed before shipment. The property is a large one, containing not less than 12,000,000 tons, and perhaps much more, though it has been explored so many times and by so many interests that the facts are pretty well established. There is a considerable tonnage that does not require dressing, but is rich enough to ship. The history of this property is a long and varied one, and it has been explored and abandoned by half a dozen concerns.

E. F. Bradt, who has been manager of the Leonard mine, Mesabi range, has become interested in a salt-mining proposition in Detroit, Mich., and has let a contract to the Wallace Contracting Co., of Duluth, to sink a 3-compartment shaft 900 ft. for rock salt. This shaft will ultimately be put much deeper, but not for the present. The company will be able to mine and hoist from this shaft from 300,000 to 400,000 tons a year, making it one of the very important propositions of that kind. With Mr. Bradt are a number of leading men of the Michigan salt industry.

The last load of ore from Duluth docks left December 9, the latest date that any shipments have ever been made. One year boats were loading until December 6, but that was exceptional. The Duluth, Missabe & Northern road has moved about 50,000 tons in December, and its total for the year is 4,649,611 gross tons, or 700,000 tons short of the preceding year. All other ports are idle. Most of the Northwestern ore-carrying lines will maintain a large force of men in shops and on the line all winter preparing for the business of 1905, which they all expect to be enormous. The two roads belonging to the United States Steel Corporation will both maintain a large crew in shops. Both roads will do a large amount of work in additional track laying, chiefly double trackage and rearrangement of yards. The Duluth & Iron Range will build to the new Syracuse mine, section 6-58-15, and will spend perhaps $200,000 in the rearrangement of its yards at Fayal, running them down to the south end of the mine, and coming into the new shovel pit under the tracks reaching Troy mine. This will make it an easy matter to handle an immense tonnage from Fayal, up to, say, 2,000,000 tons a year or more. The Duluth, Missabe & Northern road is double tracking near Hibbing, and is liable to do other work. The two roads are spending $2,000,000 in docks and equipment for the coming year, and will be prepared to move up to 7,000,000 tons each, if desired.

Deadwood. Dec. 10.

The Spearfish company is now paying its dividends quarterly instead of monthly, as has been the custom in the past. The first dividend under the new order of affairs will be declared on December 25. It will be at the rate of one and one-half cents per share, and will amount to $22,500. This will bring the total of distributions for this company up to $165,500. The company is operating its cyanide mill at Ragged Top at full capacity, and has five years' ore blocked out in the reserves.

The Victoria company, owning property north of the Spearfish, on the same ore contact, is preparing to build a 200-ton mill. The plant will employ straight cyanidation in the recovery of the values. It will be built on the hill immediately below the big open cuts, and the ore will be handled entirely by gravity from the time it enters the crusher room until it is discharged as tailing. The company is also contemplating installing an electric generating plant on the Spearfish river, adjacent to the mill. Power will be generated here for operating both mine and reduction works.

The Golden West mill and aerial tram at Rochford are being rapidly completed, and will probably be in running order by January 1. The mill will have a capacity of 100 tons, using Chilean mills. The tram is 1,700 ft. long. The mill will be operated by water power from Castle creek.

Officers of the Golden Crest company were in the Hills this week looking over the property, and it is stated that the money will soon be forthcoming for taking up the labor and other accounts, and that the mill will be started after it is enlarged.

The Puritan company held its annual meeting in Deadwood this week. W. J. McGoffin was elected president and general manager, and has full supervision of the work. It was decided to enlarge the present mill to double its capacity. Ten more stamps will be erected, making 20 in all.

The Gantz Gold Mining Co. is doing some development work on the St. Elmo. A contract for 200 ft. of cross-cutting has been let, and the shaft unwatered, preparatory to the work. Men are employed at the Roosevelt in doing the annual assessment work.

JESSE SIMMONS.

Spokane. Dec. 9.

The Byron N. White Co., controlled by Byron N. White, of Spokane, and operating the Slocan Star group of silver-lead-zinc mines in the Slocan, will put in a 50-ton magnetic-zinc separator, at a cost of $35,000, at the mine, near Sandon, B. C., early in the spring. The mill, when running with a full head of water, makes 700 tons of zinc concentrate, running 35 per cent, and 300 tons of 60 per cent lead concentrate monthly. Two thousand tons of the unsold zinc concentrate are at the mill. They will be raised to 55 per cent with the magnetic separator, and will probably be shipped abroad. This company has declared a dividend of $25,000, payable December 14. It is the second one of that amount declared this year. It makes a total of $517,000 paid during 10 years, or an average of 10 per cent a year. That is in the face of the fact that the mine was closed for two years during the miners' strike in the Slocan.

Control of the Granite Mining Co., operating in Buffalo Hump, Ida., has been sold at Lewiston, Ida., to a syndicate. The transaction represents 1,037,000 shares, and they were sold for $19,000.

Work will start at once on the triple-compartment shaft of the Virtue mine, near Baker City, Ore. The stamps will be dropping within 10 days. It is the plan to sink the working shaft to the 2,000-ft. level.

The Black Butte, in Granite camp, eastern Oregon, has added two concentrators to its milling plant. The vein has been cut 60 ft. on the 145-ft. level, and only one wall is in sight. The mill at the Blue Bird, in the same camp, is running. W. I. Vinson has taken a bond and lease on the Magnolia mine, in the same camp, and expects to be working 10 stamps within 10 days.

The Eureka mine, in Slate Creek district of western Washington, has been sold to Charles H. Ballard, superintendent of the neighboring Mammoth property. The price is reported locally to be $420,000.

Jay P. Graves, general manager of the Granby Consolidated Company, announces that $125,000 will be spent in improving the plants at Grand Forks and Phoenix, B. C. Two copper stacks, making eight in all, will be installed to increase the capacity of the smelter from 2,000 to 2,700 tons. The 10 shells in the converter will be increased to 14. Blowers and engines, and locomotives to handle the slag will be put in. At the mines, new bins, crushers and motors will be put in to take the ore from No. 3 tunnel.

Waldo G. Paine, of Spokane, vice-president of the New Park Mining Company, owning the old Jawbone property, 30 miles east of Helena, Mont., has bonded the property for $50,000 to a syndicate headed by Allen G. Mason, of Tacoma. A. J. Seligman, a New York banker, is president of the New Park company. The property was free-milling gold on top, but turned base, and now carries silver and lead.

The Keller & Indiana Consolidated Smelting Co., on the south half of the Colville, Wash., reservation, near Keller, has purchased a 150-ton smelter, sampler and electric plant, all of which will be shipped to Wilbur, Wash., and hauled overland.

A. J. McMillan, general manager of Le Roi mine, at Rossland, B. C., cables that three feet of good shipping ore has been found at the 1,450-ft. level.

Butte. Dec. 8.

Papers by which the property of the Indian Queen Mining Co. becomes an asset of the Amalgamated Copper Co. were signed in Butte to-day. The purchase price was $125,000. The property comprises three mining claims, a 30-ton Fraser & Chalmers blast furnace and water right. It is on Birch creek, Beaverhead county, 50 miles southwest of Butte. The ore carries copper, silver and gold, the former predominating. With the exception of about three months, the Indian Queen had been operating the mines and smelter continuously since July, 1903, turning out up to last Monday about $120,000 worth of matte, assaying on an average of 54 per cent copper. The product was sold at the Taylor & Brunton sampling works, Butte & Boston and Heinze works in Butte. All of the stock in the corporation, consisting of 300,000 shares, was held by Thomas F. Stephens, T. W. Ellis and William Robertson, of Butte. The Amalgamated intends to sink a 1,000-ft. shaft on the property and open up the ground below the water level, which has not been reached.

The Original Mining Co., controlled by W. A. Clark, has closed its blister copper furnace in the company's plant and will substitute three converters early in the spring. It will also erect a brick stack 350 ft. high near its smelter, to carry away the sulphur fumes from the plant. The stack will be patterned after that built by the Washoe company, near Anaconda, and connected with the furnaces by a flue.

The Parrot company will resume the extraction of ore from its Parrot mine next week. The shaft has been in the hands of the timber crew about three weeks.

The Reins Copper Co., operating the Combination mine, east of the city, has completed its station on the 800-ft. level, and will begin installing its new 800-gal. pump to-morrow. While this work is in progress it will open a level at the 600, at which depth the shaft passes through a vein of copper-silver ore. After the pump is in running order the company will resume work in the vein on the 800.

The Blackrock company, composed chiefly of Minneapolis men, is preparing for extensive work on the Blackrock mine, on which it has secured a five years' lease from all of the owners except W. A. Clark, who signed for only three years. The property is north of Butte, and formerly yielded considerable of the ore treated in Mr. Clark's plant. In prosecuting the preliminary work the Blackrock company struck a vein of gold and silver ore which no one knew traversed the claim. The property is developed to a depth of 450 ft., but the lower openings are full of water. The pumps are at work on it, and the company expects to reach the bottom next week.

Harry and Marshall Smith have struck two feet of ore on the Copper King, two miles southeast of Parrot, Madison county. An assay gives it a value of 12.5 copper, $2.80 gold and 0.85 silver. The claim has been undergoing development for several months.

The smelter of the Colorado company will go out of commission entirely on December 10. In order to clean up the ore on hand at the time the order to close was issued, one furnace has been kept in operation. The suspension will mark the close of a successful run of 25 years.

Bisbee. Dec. 10.

Ore running up to 15 and 17 per cent has been cut in the Mars shaft of the Chiriachua Development Co.'s property in the mountains of that name, 40 miles east of here. This shaft is an incline on the north end of the company's property, and runs under a great gossan cap that is from 100 to 200 ft. wide and very prominent. The lime at the point where the shaft has been sunk is much disturbed and leached by water action. This new find looks very promising and gives indications of persistence, according to reports from the mine. Ore was cut in a tunnel near the location of the main vertical, or Planet, shaft, 3,000 ft. from the Mars, and it was hoped that this same body would be cut with a drift north from the Planet shaft. There is nothing to indicate any connection between the ore now cut and these other workings, and there is no probability that they do connect, in spite of wild rumors about the mine. Mars shaft is down 350 ft. and has been in ore for the past 20 feet. This is the only property in the Chiriachua mountains that has reached a point where it may be said to have ore, though copper, lead and silver, the latter of great richness, have been found in several prospects thereabouts. But none of them have gone deep enough yet.

At Bisbee the parties controlling the Shattuck-Arizona company have taken the prospect that was some months ago bonded by Messrs. Pattison and Crosby, of Duluth. There are 14 claims in this group, and they lie to the east and north of the generally accepted line of ore deposits, adjoining the Junction company and running down to the World's Fair group. As the formation there is not known, a diamond drill or two will be put at work on these claims to determine the possibility of mineralization by the character of the ground at considerable depth. If it is found that the lime dips under the porphyry and that the conglomerate has been laid down rather thin there, it is likely that a shaft will be sunk in the hope of making a mine. The group covers more than 200 acres.

Houghton Development, which has been in silver and lead ore for some distance in its main tunnel, is now cutting occasional seams of the same material, but is out of the large body. This ore will be stoped out and shipped to the smelter.

Calumet & Pittsburg pumps now seem to be draining about all the mines in camp, but are still lowering the water a foot a day, and the shaft is going down at that rate. This stock is very sensitive to any reports of good material cut, and incipient booms start on the slightest provocation. The pumps are lifting 2,600 gal. daily, and the shaft is down to the 1,040-ft. level. The material cut in the shaft is favorable for ore concentration at greater depth, and the company fears it may get ore in the shaft, but hopes not.

The Copper Queen is making its monthly turnout of copper about the same as in October, 6,000,000 lb. a month. This is the largest in the company's history, and shows an enormous gain over a year ago.

Sudbury. Nov. 26.

The Huronian company, a subsidiary concern of the Canadian Copper Co., of Copper Cliff, is rapidly completing water wark power at the High Falls on the Spanish river, four miles north of the Canadian Pacific railway at the new station, Turbine. The operations are on an extensive scale, the dams being of concrete, and at present the development of 11,000 h. p. is aimed at, but this may be doubled later. It is expected that the Copper company's mines an dsmelters will be operated by this power next year at a much lower cost than at any previous period.

The Hermina Mining Co. of Massey Station, continues development work on its copper properties in the township of Salter. The claims are adjacent to the Massey Station Mining Co.'s mine. The Hermina company is comprised of Duluth and Marquette mining men.

It is reported that new bodies or bands of high-grade hematite ore have been struck in the lower levels of the Williams iron mine on the Algome Central railway. These show a total of 23 ft. of clean ore, with an additional 10 ft. or so of second grade ore, in a total width of 60 ft. This is an entirely new iron area.

Paul Hock and Jules Weill, members of the General Metal Products Co., of France, paid Sudbury and vicinity a visit last month.

Toronto. Dec. 10.

A meeting of the executive board of the Dominion Iron & Steel Co. was held in Montreal on December 7. J. H. Plummer, president, and Frederic Nicholls, vice-president of the company, who had just returned from a trip of inspection of the works at Sydney, N. S., reported that the heavy expenditure necessitated by the installation of the coal-washing plant was fully justified by the economies effected and the marked improvement in the quality of the product. The blast furnaces are turning out pig iron of a superior quality, and the yield is considerably increased. It is in contemplation to put the rod mill on double shift, owing to the number of orders for rods received. The company expects to have the steel rail mill in active operation in about three months. It will shortly install a plate mill, most of the machinery for which is already on the ground. During the shipping season of the present year the company brought to Sydney 290,686 tons of iron ore, of which 222,050 tons came from its own mines at Watana, Newfoundland; 25,000 tons from Cartagena, Spain; 24,650 tons from Sweden and 18,936 tons from Lake Superior mines.

A rich strike is reported at the Paymaster gold mine of H. W. 20, adjoining the Big Master mine locations near the northeast end of Upper Manitou lake in the Rainy River district, Ont. A remarkably rich body of ore was encountered while sinking a shaft from the 100-ft. level. The width varies from two to three feet. A couple of specimens of highly mineralized bluish quartz are in evidence which are literally seamed with streaks of gold, and represent a value of $20,000 per ton. The find has excited much interest in mining circles. The mine is owned by the Northern Development Co., of Detroit.

Some interest has been excited by the republication of an article by Joseph Wharton, the eminent metallurgist of Philadelphia, as to the presence of palladium in the nickel ores of the Sudbury region in quantities sufficient to make it a valuable commercial by-product. It is known that palladium is produced by the Oxford Copper Co. of New Jersey, which refines the matte produced at Copper Cliff, Ont.; though the percentage is exceedingly small, being estimated at 1-100 of 1 oz. per ton—or 1 oz. per 100 tons, which would make 3,000 oz. from the 300,000 tons annually treated—the metal being worth about the same as gold.

Thomas W. Gibson, director of the Ontario Bureau of Mines, states that it has long been known that platinum, an allied metal, was found in the form of sperrylite in the gossan of the Vermillion nickel mine—which, however, has not been worked for some years. It is also known that platinum occurs as sperrylite in some of the nickel mines of Sudbury, though in exceedingly small quantities. In Mr. Gibson's opinion there is no reason why, if palladium can be recovered, platinum should not also be profitably produced. The operating companies have not made public any facts as to these by-products. Platinum and palladium are stated to occur in the proportion of one-fourth to one-half ounce per ton in the matte produced by the Canadian Copper Co. Dr. T. L. Walker, of Toronto University, long since detected the presence of rhodium, osmium and iridium in these ores, but in exceedingly minute quantities beyond the possibility of economic recovery.

James Hunter, mining promoter, and D. Mann, vice-president of the Canadian Northern railway, are in Winnipeg negotiating for the development of the Atikokan iron range. Mr. Hunter has succeeded in interesting some leading Eastern capitalists in the enterprise, and a large amount of capital has been secured. A blast furnace will be built on the Neebing river, between Port Arthur and Fort William, and a spur line will connect the range with the Canadian Northern.

The plant of the Imperial Steel & Wire Co., at Collingwood, Ont., was put in operation on December 5. It has a capacity of 50 tons per day, and everything is of the most modern type. The company has sufficient orders on hand to keep the plant running until next May.

The total output of the Dominion Coal Co.'s mines at Glace Bay, N. S., for November was 232,720 tons, being 61,318 tons less than in October. The shipments for the month were 215,746 tons.

The Arsenical Ore Reduction Co., of New York, is building a concentrating plant at Net Lake, three miles from Temagami. It is the intention to send the concentrate from this plant to Niagara Falls, where the by-products will be put through the finishing processes by electrical energy. A diamond drill is at work on the iron properties in which T. B. Caldwell is interested at Temagami.

Victoria. Dec. 10.

The Coast.—Injunction proceedings to restrain the Britannia Copper Syndicate from disposing of stock for a lesser amount than $1,100 have been begun by a Mr. Strong, a minor shareholder. The action is taken in consequence of a proposal sanctioned at a general meeting of shareholders, held in Vancouver on November 15 last, to increase the capital of the company to $625,000, the directors having been authorized to arrange for the underwriting of a new issue of shares at par, provided that existing shareholders should first have the right to subscribe in proportion to their present holdings. Mr. Strong's contention is that as the stock is now quoted at a considerable premium, it would be unjust to present holders to invite subscription to a new issue at a lower valuation.

The resumption of smelting operations at Crofton is under contemplation, this, however, being largely dependent on whether the company is successful in securing, in competition with the Ladysmith and Tacoma smelters, the contract for treating the Britannia output next spring.

Operations at the Van Anda mines, Texada Island, were suspended last week, but whether absolutely or not is not yet known. From a recent statement of the manager, however, it is concluded the cessation is merely temporary. The decision to close the mine was arrived at after the inspection of the property by Dr. Hope, of Birmingham, England, a representative of the company.

The drainage tunnel at the Cascade mine, in the Alberni district, has been completed, and preparations are now being made to ship ore which carries good copper values. As a result of extreme low water on the Fraser river this year placer miners anticipate rich results from working bars which are now exposed for the first time since 1893. In that year Churn and other bars were most profitably worked. The Yale Hydraulic Mining Co., near Yale, has completed the work of installing 6,000 ft. of pipe line, into which the water has been turned. One monitor is now in use. The gravel works easily and is said to contain good values.

Boundary.—Two of the recently opened high-grade mines, the Skylark and Silver Cloud, near Greenwood, are arranging to ship ore, and two carloads will be sent out from the Skylark this week. A further payment on account of the E. P. U,, a property of the same class, was also made. The British Columbia company has acquired from the owner, J. J. Campbell, of Nelson, B. C., a bond on a three-quarters interest in the Emma Jumbo and Minnie Moore mines, the ore from which carrying large iron percentages is valued for fluxing purposes. An electric locomotive will shortly be installed in No. 3 tunnel level at the Granby, for use in hauling ore to the new 150-ton crusher, which has been ordered. The crusher will also be electrically operated.

The first car-load shipment, just made of (so described) second-class ore from the Skylark, which is being worked under bond, yielded $107.25 per ton in gold and silver. Shipments have also been made from the other high-grade mines—the Silver Cloud and E. P. U., the latter realizing $2,000 on a 20-ton shipment. The work of installing two new furnaces at the Granby smelter is now in prog-

ress, while at the Boundary Falls smelter a second furnace will probably be blown in next week.

Cariboo.—The Waverly mine at Barkerville has paid on last season's working a dividend of $4 per share. At Slough creek diamond drilling and pumping work are still in progress, and doubtless arrangements will be made by the receiver in London for the continuation of operations. The water is said to be steadily decreasing at La Fontaine mine, while pumping operations at Willow river are being continued, it being proposed to commence drifting after cold weather sets in. Active operations are to be resumed shortly on the Maggie group, in the Ashcroft district, on which a bond is being arranged. Some $70,000 has already been spent in the development of the property.

Reorganization having been agreed to, as recently outlined, the Cariboo Consolidated (1904) Ltd., has been registered, with a capital of £120,000 in £1 shares.

East Kootenay.—Three of the Michel mines, No. 3, 4 and 5, have been closed, work being now concentrated at No. 8 and 9 mines.

The North Star company recently declared a dividend of 3 cents per share.

Nelson.—The manager of the Arlington mine at Erie states that the net returns on 87 tons of ore shipped last month were $1.180. The total expenses for the month in British Columbia were $3,458. At the Ymir mine last month 1,700 tons were crushed, producing 412 oz. of bullion, valued at $4,925; 90 tons of concentrate, valued at $2,250, while the estimated value of the tailings was $550. In addition, 38 tons of crude ore were shipped, valued at $1,950. Reports from the mine have been more encouraging of late and ore of better grade has been encountered in the workings at the 1,000-ft. level.

Rossland.—Mr. James Cronin, a large shareholder and manager of the St. Eugene mine, at Moyie, has joined the directorate boards of the Center Star, War Eagle and Rossland Power companies, in succession to Mr. C. H. Gooderham, whose death recently occurred.

Lardeau.—A promising new find of galena and gray copper is reported to have been made at the Beatrice, in the Camborne district. This mine is now arranging to raw-hide 200 tons of ore for shipment from Camborne. Ore is also being shipped from the Mammoth, in the same camp. At the Silver Dollar grading has been in progress, in readiness for the erection of compressor and mill buildings.

Slocan.—In the Slocan City Division two additions were made to the list of producing mines last week, shipments having been begun from the Club and Graphic claims. The ore from the latter, sent to the Hall Mines smelter, averaged 300 oz. silver to the ton. Conditions in this section have considerably improved during the past few months, shipments already being about 75 per cent in advance of last year's production. At Woodberry creek preparations are being made for the commencement of shipments from the Pontiac and Baltimore claims, the ore from which carries high silver values.

Monterey. Dec. 9.

W. C. Greene, president of the Greene Consolidated Copper Co., of Cananea, has taken charge of the Sierra Madre railroad, in Chihuahua. His plans include the practical building of the new town of Dedrick, the present terminus, and rushing the line to Mulatos, making the total length of the road 120 miles. It will later connect with the Chihuahua & Pacific railroad, and possibly will continue, as mentioned some weeks ago, to the Pacific or the Gulf of California coast. For the present a stage line will run to Casas Grande.

The Rhodes Consolidated Mines Co., of Mexico, is a new organization, under the laws of New Jersey, with a capital of $200,000 gold. F. P. M. Rhodes is president and general manager, and John McGrath chief engineer. It is to operate in Chihuahua.

In Sonora, the Calumet & Sonora, about six miles southwest of Cananea, which was flooded a short time ago, is preparing to install boiler and pumps, which have been ordered and are on the way to the property. Sinking will at once be resumed, for when the water broke in good ore had been encountered, and the property gave promise of being one of the best in the Cananea district. A consolidation has been effected by the Bonanza Copper Co., the San Miguel Gold Co. and the Lastima Gold Co., including 140 pertinencias, with excellent copper-silver-gold ores, four miles from Emures. The company will be known as the Sonora Bonanza Mining Co. W. W. Barker is president. The Greene Consolidated Copper Co. produced during November approximately 6,000,000 lb. of copper, at a cost of 8c., f. o. b. Cananea, for which it will receive about 13.26c. per pound (the figures obtained in October), and will pay a seventh dividend, this time of four per cent, on December 20. The company has obtained a concession from the Mexican government, granting it the right to 10,000 cu. ft. of the Arros river, from which, it is estimated, 30,000 h.p. will be developed, at the junction of the Yaqui and Arros rivers, from which point it will be conveyed by wire to Cananea, a distance of 80 miles, and the line for which is now being surveyed. The Mina Mexicana, recently bought by a German company, is being unwatered. The Yaqui Copper Co. has raised $80,000 gold by the sale of stock, of which there still remains 50,000 of the 125,000 shares donated to the company by the stockholders for continuing development. The 50-ton pyritic smelting plant being erected at La Calera, in the Sahuaripa district, is expected to be in blast by March of next year. Chas. Weiss and associates, of Portland, Ore., have struck some ore running as high as six ounces gold, in the San Carlos, at Janoverachi, and new machinery and pumps have been ordered.

London. Dec. 3.

The mining market has been perturbed to some extent by the temporary collapse of an outside brokers' firm called the London & Paris Exchange, Ltd. The newspapers here have made a tremendous fuss about this event, and it is probable that the news cabled over to the American press will be exaggerated and sensational. The scarcity of business generally is the reason why many small events are magnified inordinately. The facts are these: The London & Paris Exchange, Ltd., is run by Alexis Morton Mandeville, a shrewd and enterprising man. It has been in existence for nearly 10 years, and during the past two or three years has assumed extensive proportions. The advertisements in the financial and other papers are on a large scale, and there are branch offices in nearly all the important towns in England. It was not a vulgar bucket-shop, but conducted its business in a manner precisely similar to that of the ordinary speculative inside broker. The only difference was that Mr. Mandeville was not a member of the Stock Exchange, and that the clientèle was recruited by public advertising. Mr. Mandeville has a good connection on the Stock Exchange, and transacts business with many influential houses. The present crisis has been caused by his being caught short of certain mining shares, of which he was a bear, and his liabilities are due both to his own clients and to members of the Stock Exchange. It is not likely that the latter will allow the company to be wound up, for they would not care to have their transactions with an outside broker's firm to become public property. So that it is probable that the creditors will deal gently with him. The whole case has been exaggerated, owing also to the name of the firm. "The London & Paris Exchange, Ltd.," has an imposing look, and leads the unwary to imagine that it is a sort of public institution. It is interesting to note that Mr. Mandeville has many other interests besides finance. For instance, he is owner and editor of a weekly paper called *London Opinion.* Probably this multiplicity of interests is the real cause of his being caught napping in the speculative mining market.

This incident of a concern caught by the rise in certain shares is an indication that the mining market is beginning to show some firmness. Though there is very little actual business stirring, there is a much more hopeful feeling in South Africans than for a long time. The labor problem is being solved more successfully than many of us expected, and business generally in connection with South Africa is improving. Egyptians are also active. Several of the mines there will be active producers shortly, and quite a number of new prospecting expeditions are being organized.

An interim report published by the St. John del Rey Mining Co., operating in Brazil, shows that the recent issue of preference shares, commented on by me at the time, was extremely successful. Applications for 75,000 shares were received, almost entirely from present shareholders. At the time I mentioned the anomaly of creating new capital, when the company had a reserve fund of £60,000. From the point of view of the shareholder, no doubt, the proposition of a 10 per cent preference share was attractive. Besides, it was practically imperative to take them up, as the dividend on the ordinary shares was only 5 per cent, and the position of an ordinary shareholder having no preference shares would be very unfavorable. The report is encouraging from other points of view. The new electrical machinery for supplying power from the waterfall is on the way, and the recent developments have disclosed large bodies of ore. During the past six months the 120 stamps have been regularly at work, and have treated 70,000 long tons of ore, with a recovery of $9.80 per ton.

Perth. Nov. 7.

The gold yield of this State for October was 208,925 oz., value £741,686. Dividends for the expired 10 months of this year, paid by the West Australian companies, were £1,788,682.

Kalgoorlie.—The opening out at the 1,900-ft. level at the Great Boulder Proprietary is being pushed. The main shaft at the Boulder Perseverance is down to 1,300 ft.; opening out at that level is now started. One result of the recent official inquiry into the mines' management has been to ascertain thoroughly the values of large bodies of ore hitherto looked upon as unprofitable. The manager states that ore worth £3.10 per ton is now in sight, sufficient to maintain the present output for two years to come. At the 900-ft. level a run of highly payable ore is opened up for 100 ft., and 16 ft. wide. Other bodies proved at both boundaries of the lease, several hundred feet deeper, puts the mine in a very much more favorable position than the recent bear raid indicated.

Some very rich telluride ore is being obtained from a vein below the 150-ft. level in the Hidden Secret lease; some of it is of remarkable value, and is being reserved for special treatment.

Driving on the Australian East lode at the 12 and 14 ft. levels at the Associated is exposing highly payable ore on both sides. M. Pierre Ledoux is inspecting the Associated mine on behalf of the Continental shareholders; a large block of shares is held at Liège, Belgium.

Most of the leading mine companies have agreed to make the mines assay plans available for public inspection.

Davyhurst.—The Golden Pole is looking well; the second monthly dividend has been declared. The last crushing cleaned up 1,887 oz. gold from 986 tons treated. Some fine telluride ore is being found in the Winera lease at Mulwarrie, and a considerable quantity is now being treated.

Murchison.—The Great Fingall Consolidated's main shaft is now down to 1,275 ft. At No. 11 level, north drive, the reef averages 8 ft. in width and assays 19.5 dwt. per ton. The main shaft of the Great Fingall Associated is down to 175 feet. Mr. Hewitson, of Kalgoorlie, has been inspecting this mine on behalf of a group of capitalists, and has reported very favorably on the property.

Phillips River Copper & Gold Fields.—Work at the public smelter is being pushed, and a very large quantity of good ore now awaits treatment. A good find of gold is reported in an abandoned lease 10 miles away. Mr. Jack has arrived here and has begun his work of inspection of the Collie coal fields for the government.

PERSONAL.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. Ben S. Revett is at Boston.

Mr. Pope Yeatman is in China.

Mr. John Hays Hammond is at Flat River, Missouri.

Mr. J. Power Hutchins, of San Francisco, is in New York.

Mr. George J. Bancroft, of Denver, is at Patagonia, in Arizona.

Mr. F. H. Davis has returned to Boulder, Colo., from Bear, Idaho.

Mr. F. W. Baker sailed for London by the *Oceanic* on December 14.

Mr. L. W. Strauss, of New York, is on his way to Kingman, Arizona.

Mr. Bernard MacDonald is erecting a cyanide plant at Guanajuato, Mexico.

Mr. Forbes Rickard has returned to Denver from professional work in Arizona.

Dr. Alfred Simon, of London, is in New York on his return from Vancouver.

Mr. Walter P. Jenney, of Salt Lake City, is examining mines near Bellevue, Idaho.

Mr. A. D. MacLean is inspecting mining property in the Virgin river region, Utah.

Mr. A. L. B. Germaine Griffith has moved to London from the West African goldfields.

Mr. D. W. Brunton has returned to Denver from a trip to Tonopah and Goldfield, Nevada.

Mr. F. J. French has returned to New York from the Seven Devils copper district in Idaho.

Mr. Ray L. Herrick, recently graduated from Lehigh University, is at Kendall, Montana.

Mr. James Earls has resigned as superintendent to the Bullion-Beck Mining Co., of Utah.

Mr. H. K. Wheeler, of Los Angeles, is visiting New York and will remain there three weeks.

Mr. J. D. Hosking has resigned as superintendent of the Franklin mine at Hancock, Michigan.

Mr. Chester W. Purington passed through New York on his return from Boston to Washington.

Mr. F. H. Stanwood, manager of the Richmond Gold Mining Co., of Salina, Colo., is in New York.

Mr. W. W. Graf has been appointed superintendent of the Cliffs and Moro mines at Ishpeming, Michigan.

Mr. George A. Packard, of Boston, has returned home on the completion of the season's work in Alaska.

Mr. Joseph Fuller has been appointed manager of the Copper King Mining Co.'s property at Montpelier, Idaho.

Mr. F. W. B. Johnson has resigned the management of the Nooksack Mining Co., and is now at Seattle, Washington.

Mr. Julius Koebig has been investigating nitrate of soda deposits on the Colorado river, between the Needles and Yuma.

Mr. Raphael Hughey, general manager to the Sonora Gold Mining Co., of Mexico, is spending the holidays in California.

Mr. C. E. Lynn has assumed the management of the Gowlland Island Mining Co.'s properties on Valdez Island, Alaska.

Mr. A. J. Clissold has returned to Chicago, after inspecting mining properties in the States of Jalisco, Michoacan and Colima, Mexico.

Mr. F. M. Simonds, of the firm of Simonds & Wainwright, of New York, has returned to New York from a professional trip to Cuba.

Mr. A. R. Mynott has been appointed assistant manager to the San Albino Gold Mining Co., at Jicaro, Nueva Segovia, Nicaragua.

Mr. George Moore, inventor of the Moore slime process, has established offices with the Moore Cyaniding Co., at 11 Broadway, New York.

Mr. H. R. Smith has resigned his position at the Greenback mine, Cal., and is now connected with the Opp mine, in Jackson county, Oregon.

Mr. Frederick Butler, of Salt Lake City, Utah, has been appointed superintendent to the Bluefields Gold Mining Co., at Bluefields, Nicaragua, Central America.

Mr. Edward J. Cornish, president of the Carter White Lead Co., has been superintending the construction of a new 15,000-ton plant at Montreal, Canada.

Mr. William S. Ward, who has been acting as field commissioner to the Department of Mines & Metallurgy at the Exposition at St. Louis, has returned to Denver.

Mr. W. G. Anderson, formerly manager of the Compania Minera de Guanajuatillo, Mexico, is now superintendent to the Redfield Mining Co., White River, California.

Mr. E. H. Barton has resigned as superintendent of the Yellow Aster mines, at Randsburg, Cal., and become superintendent of the Zubiate mines, at La Colorado, Sonora, Mexico.

Mr. E. C. Bailey, of the Fairmont Coal Co., of West Virginia, is in South America superintending the delivery of a cargo of coal to the Buenos Aires & Western Railway Company.

Mr. Alexander Cunninghame, president of the Luhrig Coal Co., has returned to Cincinnati from an extended trip in Arkansas, where he has been examining anthracite coal properties.

Mr. H. G. Pemberton, general manager to the Montreal & Boston Consolidated Co., of British Columbia, has nearly recovered from injuries received from a fall from a horse several weeks ago.

Mr. Robert Mitchell, formerly manager to the Greene Consolidated Copper Co., at Cananea, Mex., is superintending the construction of a 250-ton furnace at La Dicha mines, near Acapulco, Mexico.

Mr. K. Landgrebe, formerly with the Illinois Steel Co., and assistant superintendent of the Toledo Furnace Co., Toledo, O., since March, has been appointed general superintendent of the latter company.

Mr. Joseph Randel, who for 21 years has been underground manager at the Nanaimo collieries, British Columbia, has retired and will be succeeded by Mr. Thomas Mills, the present assistant manager.

Mr. Percy E. Barbour, lately with the Tennessee Copper Co., has returned from a visit to the mines and smelter of the Canadian Copper Co., at Copper Cliff, and is now in New Mexico on professional business.

Mr. Joseph Hartley has resigned as superintendent of the Genesee Iron Co.'s plant at Charlotte, N. Y., to accept a similar position with the Londonderry Iron & Mining Company, at Londonderry, Nova Scotia.

It was recently stated in this column that Mr. Frank Klepetko is consulting engineer to the Hermina Mining Co., in the Sudbury district of Ontario. This was an error. Mr. Klepetko is not connected with the company referred to.

Mr. W. J. Sando, who has a high reputation as a pumping machinery expert, is one of the recent additions to the organization of the Allis-Chalmers Co. He will be manager of the company's pumping department, with headquarters at Milwaukee.

Mr. S. F. Parrish, formerly general manager of Le Roi Mining Co., of British Columbia, has removed his office from San Francisco to Salt Lake City, Utah, where he will continue the practice of his profession of consulting mining engineer.

Mr. John C. Bryden has been appointed superintendent of the Consolidated Coal Co., with offices at Frostburg, Md. He was formerly superintendent of the Somerset Coal Co. Mr. Frank Lyons has been appointed assistant superintendent of the same company.

Mr. L. L. Malone, formerly general manager of the Fairmont Coal Co., at Fairmont, W. Va., has been appointed general manager of the combination, composed of the Fairmont Coal Co., the Somerset Coal Co., and the Consolidation Coal Co., the three companies being under the same control.

OBITUARY.

William L. Rodgers, State Superintendent tendent of Mines of Alabama, died of acute cancer of the stomach December 5. He was a native of Speigner, Ala., and served in important mining positions with the Tennessee and other companies. Mr. Rodgers was one of the best known mining experts in the south.

SOCIETIES AND TECHNICAL SCHOOLS.

Engine Builders' Association.—The annual meeting of this association was held in New York City on December 9 and 10. The session was opened by an address by the president, Mr. C. A. Gates. Several interesting professional papers were read.

American Association for the Advancement of Science.—This association, with its allied societies, will meet in Philadelphia during the week beginning December 24. The American Chemical Society will hold its meeting December 28-31, and the Geological Society of America, December 29-31.

Bryn Mawr College.—Mrs. Charles Stillwell Eldredge, daughter of the late Theodore D. Rand, who was for 31 years treasurer of the American Institute of Mining Engineers, has presented to the department of geology at this institution the private rock and mineral collection left by Mr. Rand, comprising about 30,000 specimens.

Bessemer Pig Iron Association.—The annual meeting of this association was held at Cleveland, O., December 3. It was decided to continue the association for another year from January 1, 1905. The following officers were re-elected: J. G. Butler, Jr., president; Samuel Mather, L. C. Hanna, E. L. Ford, Frank Hitchcock, J. B. Stubbs, Robert Bentley and J. G. Butler, Jr., executive committee.

Montana Society of Engineers.—The following nominations for officers of this society for 1905 have been made: Ernest W. King, president; Bertram H. Dunshee, first vice-president; Edward C. Kinney, second vice-president; Clinton H. Moore, secretary and librarian; Samuel Barker, Jr., treasurer and member of the board of managers of the Association of Engineering Societies; Robert A. McArthur, trustee.

Society of Chemical Industry.—The New York section, at its meeting on December 16, will present the following papers: 'The Improved Method of Applying Radium,' by H. Lieber; 'The Chemical Combination of Knall Gas under the Action of Radium Radiations,' by B. Davis and C. W. Edwards; 'Commercial Fusel Oil,' by Samuel F. Ball; 'The Use of Crude Oil for Roadmaking and Method for determing the amount of Asphalt in it,' by Dr. Basil W. Alexander.

TRADE CATALOGUES.

The Prindle standard house-tank pumps are described in a tasteful booklet issued by the Prindle Pump & Engineering Co., of New York.

The A. Leschen & Sons Rope Co., of St. Louis, are sending out a price list of its galvanized wire strand which received the grand prize at the St. Louis Exposition.

The American Steel & Wire Co. issues a little treatise on sulphate of iron, in which it sets forth the advantages of this substance as a disinfectant, deodorizer and wood preservative.

'Ryerson's Monthly Journal and Stock List' for December has been issued, and contains, as usual, a complete list of the machinery on hand by Joseph T. Ryerson & Son, of Chicago.

A silhouette of the United States battleship Connecticut, for which the Crocker-Wheeler Co., of Ampere, N. J., is supplying the elec tric light and power plant, is sent out by this company.

'Something Pneumatic' for November, issued by the Chicago Pnuematic Tool Co., contains the usual amount of interesting information about the products of this company. There are many excellent pictures.

In a new catalogue issued by the Niles-Bement-Pond Co., of New York, devoted to

filter presses, considerable space is given to a description of the new steel panel plate, which is made a feature in some of the new filters made by this company.

The annual catalogue of the United Engineering & Foundry Co. makes an imposing cloth-bound volume of over 200 pages. It contains many excellent illustrations of machines made by the company, and is in all its features a most creditable piece of work.

The Roberts & Schaefer Co., of Chicago, has issued a tasteful booklet, which contains an essay on 'Coal Washing for Fuel or Coke,' by John V. Schaefer. There are also descriptions and illustrations of some of the washing plants lately built by this company.

'Pumping Machinery' is the title of a 132-page catalogue issued by Henry R. Worthington, of New York. The book is printed in two colors, the cover is lined, and no expense has been spared to make it one of the handsomest machinery catalogues we have seen in some time.

The Solar Motor Co., of Boston, has issued an interesting pamphlet in which is described the operation of its motor, which is a utilization of the sun's rays for producing power for irrigating and for other light operations where power is required. The solar motor is now in successful operation near Willcox, Arizona.

The Allis-Chalmers Co., of Milwaukee, has prepared an exceptionally artistic little book entitled, 'The Power of the New York Subway.' It contains many excellent pictures of the great engines made by this company to provide power for the subway as well as much interesting information about the wonderful tunnel.

INDUSTRIAL.

A 100-ton Moore slime filter, made by the Allis-Chalmers Co., was recently shipped to the Occidental Gold Mining Co., of New South Wales.

The Denver Tank Co. has closed contracts for the following cyanide plants: 100-ton plant to Magnolia, Colo., a 50-ton plant to Arizona, and a 50-ton plant to Silver City, New Mexico.

The S. H. Supply Co., Denver, Colo., has made recent sales of a 100-ton concentrating mill with crushing plant to Washington; a 50-ton concentrating mill to Arizona, and one to Boulder county, Colo.; a 50-ton crushing plant with gasoline engine to Tonopah, Nevada.

Mr. John A. Avirette, superintendent of the Pietres Verdes Mining Co., at Urique, Chihuahua, Mexico, wishes catalogues of manufacturers of mining machinery. This is a new company and will be in the market for practically everything used in the equipment of the mine.

The Westinghouse Electric & Manufacturing Co., through its agents, Messrs. G. & O. Braniff & Co., of Mexico, has been awarded the contract for all the electrical apparatus to be installed by El Oro Mining & Railway Co. at El Oro, Mexico. The contract amounts to nearly $100,000.

A 250-ton furnace was recently shipped from San Francisco to Acapulco, Mex., to be erected at La Dicha mines, which are located a few miles inland from there. It is expected to be in operation late in January. Arrangements have already been made to ship the ore to this market by way of San Francisco and Galveston.

The Fairmont (W. Va.) Coal Co., with offices at Baltimore, Md., made a shipment last month of 4,500 tons of sulphur coal to Buenos Aires. The cargo is intended for the Buenos Aires & Western Railway Co., which will give it a trial alongside of Cardiff coal, which at present supplies that market, and if the Virginia product gives good satisfaction it is likely that a large order will result.

The Jeanesville Iron Works, of Hazleton, Pa., reports through its Denver branch, the following late shipments: Two electric driven power station pumps, 1,000-ft. lifts, to Camp Bird mine, Ouray, Colorado. One station pump, comopund condensing, to Parral, Mex.; one station pump to Nevada; one sinker to Central City, Colo.; five Wyoming steam separators to Bisbee, Ariz.; one to Crested Butte, Colo., and one to Parral, Mexico.

A contract recently closed with The Westinghouse Machine Co., provides an initial equipment of 4,000 kw. in two generating units of 2,000 kw. each, for the Baltimore Electric Power Co. A Westinghouse electrical equipment, complete and modern in every particular, has also been contracted for. Officers of the company state that the power plant will embody the latest developments in steam and electrical engineering. The building is to be of fireproof construction throughout, the structural steel frame also serving as supports for the boilers and the overhead coal bunkers. Being located outside of the congested districts of the city, all the boilers and heavy machinery will be on the ground floor. Floors and roofs will be of steel-concrete construction.

The Chicago Pneumatic Tool Co. reports that it is in receipt of a cablegram for 705 tools through its London branch, The Consolidated Pneumatic Tool Co. The business of this company for the month of November in the number of orders, far exceeds that of corresponding month last year, and also previous month this year, and indications are that December will be equally as good, if not better. President Duntley, who is now in England, cables that demonstrations of the electric drills corresponding in size to the "Little Giant" have proven a success and inasmuch as there is a large field for drills of this kind, the company expects, in time, that its business in electric drills will exceed that of pneumatic drills.

The Burt Manufacturing Co., of Akron, O., has recently sent six of its oil filters to supply its trade at St. Petersburg, Russia, and 27 oil filters and exhaust heads to its agency at Genoa, Italy. It has also made a recent shipment of 12 exhausts and three oil filters to its agency at Malmo, Sweden.

GENERAL MINING NEWS.

Mineral Oil Exports.—In November and the 11 months this year exports of mineral oils from the United States were as below, in gallons:

		January–November.	
	November.	1904.	1903.
Crude	7,713,991	89,017,965	112,478,339
Naphthas	881,005	18,400,110	10,803,613
Illuminating	65,573,016	694,942,151	607,297,718
Lubricating & paraf.	9,382,854	78,931,864	85,057,975
Residuum	5,601,464	31,899,920	7,007,305
Total	89,152,330	912,992,010	822,644,950

The increase this year is 90,347,060 gal., equivalent to nearly 11 per cent, principally in illuminating oil and residuum.

ARIZONA.

GRAHAM COUNTY.

Arizona Copper Co.—This company concentrates 700 tons of sulphide and oxidized ores a day at its Clifton mills. The product is 120 tons of concentrate. The sulphide ores run about 3 per cent copper, the jig concentrate from them running 17½ to 18 per cent copper. The Hancock jig, in use here, has a capacity of 35 tons of ore per hour. The tailing from this jig passes through a Huntington mill, thence to vanners. A. Morrison, mill superintendent, states that the Hancock does the work of 16 Hartz jigs and uses only the same amount of water as two of the latter. The oxidized ores are concentrated separately, the tailing from them passing to the leaching plant, the latter being in charge of John Grimes. The company's concentrator, located near Longfellow, is handling 350 tons of ore per day and is making a product of 50 tons per day of concentrate.

Clifton Consolidated Copper Co.—This company, resulting from a merging of the interests and holdings of the New England Copper Co. and the Clifton Consolidated, has a large area of ground on the great copper belt as it strikes north from Morenci and Metcalf. Development on the consolidated properties is extensive, with good equipment for mining.

Standard.—This mine, located north of Chase creek, near Metcalf, is shipping 15 tons of copper ore daily to the Shannon smelter at Clifton. It is stated these shipments have averaged 20 per cent copper. The mine has been developed by 5,000 ft. of work. The ore is carried from mine to shipping bins at the railroad over an aerial trainway. A. S. Rosecrans, of Metcalf, is superintendent.

MARICOPA COUNTY.

Oro Grande.—This mine and mill are situated five miles northeast of Wickenburg. The mine is in a mineralized zone running through diorite and rhyolite and having a porphyritic gangue. The width of the orebody, as shown by development, averages 120 ft., though the ore boundaries are not well defined. The entire mass is a low-grade ore, within which are richer stringers and lenses. The ore is very free-milling and contains oxidized iron. Development has extended to 300 ft. depth, and no sulphides have appeared thus far. The bulk of the ore is hoisted from the 100 and 200-ft. levels. The 10-stamp mill crushes an average of 48 tons per day, 80% of the values being saved on the mortar plates. The pulp passes from the mortars through a 40-mesh screen to a three-section plate below each battery. The milling ore runs from $5 to $5.50 per ton. A 40-h. p. gasoline engine operates the mill, a similar engine of 15 h. p. doing the hoisting. The water for all purposes is pumped from the Hassayampa river by a 20-h. p. gasoline engine, raising it 433 feet.

CALIFORNIA.

AMADOR COUNTY.

Copper Hill.—At this mine, on the Cosumnes river, owned by W. F. Detert, hoisting works are being erected, and when they are completed sinking will be begun.

Emmons.—This mine at Pine Grove has been bonded to J. J. Cranmer, who expects to have the property working in a short time.

José Gulch Mining Co.—This company has cleaned out the tunnel in the old works of the Red Hill mine and re-timbered it. The mill has been started up.

Wildman.—Good progress is being made on the drift to connect the Lincoln shaft with this and the Mahoney mine at Sutter creek, and there are good indications of a ledge to be encountered.

CALAVERAS COUNTY.

Duryea Mining Co.—This company, at Central hill, has placed an order for a new mill to crush the gravel. D. A. Nuner is superintendent.

Sentinel.—This mine, owned by Mr. Clark, of Los Angeles, is being worked for him by John F. Swank, who has run a 200-ft. drift from the main shaft.

Utica Mining Co.—At this property, Angels, L. W. Shinn, superintendent, they have started up the new Rix duplex 20-drill air compressor. The 100-stamp mill at the Stickle is running continuously. At the Cross they now have water, electric and steam power.

EL DORADO COUNTY.

Eagle Bar Co.—The crib-dam on the American river, below Josephine, having been completed, this hydraulic mining company will shortly commence piping.

River Hill Mining Co.—In this mine, Placerville, Thomas Clark, superintendent, the ledge on the 1,000-ft. level, recently encountered, has been drifted on for 500 ft., maintaining its size and richness. A new hoist has been installed on the 1,000-ft. level for continuing the winze down 200 ft. deeper.

INYO COUNTY.

Florida.—This mine at Lida is shipping via Bishop some exceptionally rich silver ore. A pump is being put in to secure a larger water supply.

Virginia.—This group of mines in Kearsage district has been purchased by J. D. Hubbard, of Chicago. There is considerable ore sacked ready for shipment, as the property is being worked under lease by W. H. Naylor. There are five claims in the group, all of which were more or less worked many years ago.

MARIPOSA COUNTY.

Mariposa Commercial & Mining Co.—The new buildings to replace those recently burned at the Princeton mine have been completed. Only 10 stamps of the mill are dropping at present.

NEVADA COUNTY.

Esperance.—At this drift mine, French Corral, R. A. Thomas, superintendent, the tunnel is being cleared out, and new flumes are being built.

PLACER COUNTY.

Bouk.—A 5-stamp mill has been installed at this mine, near Auburn. A contract has been let to sink the shaft 100 ft. deeper.

Southern Cross Mining Co.—More men are being put at work on this mine near Towle, W. R. Tremble, superintendent. A compressor has been added to the plant.

SHASTA COUNTY.

Gambrinus.—The eight men who had the 50-day lease on this mine at Whiskeytown cleared $9 per day each.

Hazel Gold Mining Co.—Work in the new 3-compartment shaft of the Gladstone mine, French gulch, has been begun. About 100 men are now at work.

Mammoth Copper Co.—Work has commenced on the contract for the erection of the buildings for this company near Kennett. When these are finished the smelter buildings are to be put up. The town of Kennett was almost destroyed by fire last week, but this company lost only its office building, the contents being saved.

SIERRA COUNTY.

Oriental Mining Co.—The ledge, for which this company at Alleghany has been running for the past three years, has at last been struck. It is from 8 to 13 ft. thick and of satisfactory value.

SAN BERNARDINO COUNTY.

Big Lode Mining Co.—At this property, 15 miles from Hesperia, J. C. Britton, superintendent, a mill will be erected.

SISKIYOU COUNTY.

King Solomon.—At this mine the men are running a cross-cut from the 700-ft. tunnel to tap the high-grade ore found at the bottom of the shaft. A milling plant is contemplated.

Mount Shasta and Sightman.—These two hydraulic claims have been bonded to capitalists of Portland, Oregon.

STANISLAUS COUNTY.

La Grange Mining & Hydraulic Co.—This company, owning ground from La Grange to Patricksville, has done no mining of any account for some years, but has now begun hydraulicking at the Patricksville diggings. The superintendent is Thomas Donohue.

TUOLUMNE COUNTY.

Draper Mining Co.—Failure to pay wages due workmen has caused a temporary shut down of this property.

Pocket.—William Lewis has shipped to the mint $10,000 taken from a 'pocket' in this claim.

COLORADO.

LAKE COUNTY—LEADVILLE.

The amount of zinc shipped from the camp during the month of November reached 8,000 tons, and came from the Iron Silver Mining Co.'s properties, the Yak tunnel and several other smaller shippers.

Big Four.—E. A. Smith and associates have taken a lease on this property and are doing considerable development towards the Ollie Reed, to catch the same ore-shoot recently struck in the bottom of that shaft. Several streaks of mineral are being followed, and enough ore is being taken out to more than pay the running expenses.

Cloud City.—A 10-inch water column, which will be carried down to the 500-ft. level, is being put in, a pump is being installed at this level, and the work will be completed by the end of the week, and sinking will again be resumed.

Fanchon.—Preparations are being made to drive the big tunnel 2,000 ft. from the north side of the mountain into the vein. It will cut a number of veins, and the owners will use the tunnel to work their properties from it. The work of driving the tunnel will start the first of the year.

Ibex.—The lessees on this property are turning out a good grade of mineral and plenty of it, the tonnage being in the neighborhood of 6,000 tons per month.

Little Sister.—The drill hole has reached a distance of 1,000 ft. and is now well into the lime, which is solid, no casing being required in the hole.

Moyer.—Of late considerable development work has been done on this property in the orebody, the result being that the management makes the statement that the mine can produce 750 tons daily for the next 25 years. This same ore-shoot extends to the northeast, and will be opened by the Tucson, which belongs to the same company, the Iron Silver Mining Company.

Wood Fraction.—This mine, which is only twenty-six one-hundredths of an acre, has in the past seven months shipped ore that netted the lessee a little over $10,000. The ore is a high-grade chloride, running 450 oz. silver per ton. The shoot extends into the P. O. S. ground and is worked by the same lessee.

ILLINOIS.

PEORIA COUNTY.

Sholl.—Fire was discovered in this mine, at South Bartonville, December 9. One hundred men who were in the mine narrowly escaped. The cause of the fire is unknown.

INDIANA.

The demand for Indiana coal has not come up to expectations. In some branches of the bituminous trade prices are no higher than they were in July. The operators still complain of a shortage of cars, and say this is annoying, since the market is dull. There is a renewal of trouble in the Indiana mining field over the basis of pay for the screened coal.

The car shortage in railroad transportation for coal has become so pronounced that numerous mines in this State are working only 50 to 65 per cent of their capacity, owing to this cause. A few mines are closed down for want of water, the drouth having been prolonged until water has become a luxury. There is no urgent demand for coal, however, and the cessation is not a source of great anxiety at this time.

SULLIVAN COUNTY.

The first local consignment of coal from its mine in this county arrived in Anderson recently for the Union Coal Co. It is being thoroughly tested by the stockholders, the majority of whom are manufacturers, who heretofore used gas.

For ten years or more vast quantities of coal were mined under the town of Shelburn. After it was thought the field had been thoroughly worked the mines were closed and the town dwindled away. Recently some Chicago capitalists put down some test holes east of the old Shelburn mines, and a large area of coal was discovered. Mine shafts by the score are being sunk, and Shelburn is enjoying another boom because of the second discovery of coal.

LOUISIANA.

CALCASIEU PARISH.

Jennings.—The Seagrove well has brought in a gusher, and the syndicate which owns it has already 100,000 bbl. to sell. The Wilkins Oil Co.'s No. 2 is now the best well in the field. Its daily output is said to reach 15,000 bbl. Since it came in several of the other big gushers have ceased flowing, caused doubtless by the relief of the gas pressure. Shipments are increasing rapidly and prices have dropped—one lot of 50,000 bbl. was sold to Beaumont parties at about 17½c., which would bring the cost delivered at Beaumont to about 27c. There are different opinions regarding the present daily production; salt water has appeared, and while the latest gushers are large producers, the flow of the older ones has materially declined. The output evidently reached the maximum last month, and the field will follow the normal path of other southern fields—50,000 bbl. daily is a fair estimate of the present output. Crude sells in tanks at 18 to 22 cents.

PENNSYLVANIA.

ANTHRACITE COAL.

Reading Coal Co.—It is reported that this company will open three new collieries in the vicinity of Pottsville within the next year. Two of these will be at Phoenix Park, and the third in the South Mountain district.

Pennsylvania.—An explosion in this colliery of the Susquehanna Coal Co. at Shamokin on December 8 resulted in the death of Isaac Hill, assistant superintendent, and the injury of five miners.

Lehigh Coal & Navigation Co.—No. 9 col- of this company, which was flooded in 1881 to quench fire, will be pumped out and re-started.

BITUMINOUS COAL.

Monongahela River Consolidated Coal & Coke Co.—The Knox mines of this company at Brownsville are on fire.

New York & Cleveland Gas Coal Co.—This company has bought 130 acres of coal land in Plum township at a reported price of $65,000.

Penn Gas Coal Co.—This company has started full operations at its mines in the Irwin field.

Washington.—An option on about 1,500 acres of coal land is reported taken in this county by Cleveland, O., capitalists.

Pittsburg Coal Co.—This company has bought from the Pittsburg-Buffalo Coal Co. the Blanche mine property on the Wheeling division of the Baltimore & Ohio, and the Rachael mine on the Peters Creek branch of the Pennsylvania railroad. Both mines are in the district south of Pittsburg. It is chiefly an exchange transaction, the consideration being a tract of coal land adjoining the Bertha mine of the Pittsburg-Buffalo company, in the same district. The agreement also involves a continuance of the contract between the two companies relating to the division of the Lake coal trade from the Pittsburg district and the opening of new properties.

TEXAS.

HARDIN COUNTY.

Sour Lake.—A new well, owned by W. B. Sharp and others, is said to be good for 600 bbl. It is on the Oliver farm, originally leased to the Guffey company, which spent a lot of money in development before their lease was canceled by a judgment. Crude oil sells at 30 to 35 cents.

HARRIS COUNTY.

Humble.—An explosion in this field on December 13, has apparently wrecked most of the oil properties, causing losses of about $50,000. The explosion is attributed to subterranean convulsions.

Oil has been struck here in paying quantities, but, contrary to expectations, the Moonshine Oil Co. No. 1 did not come in a gusher. Just what the well will do is unknown; there has been a big rush to this field, large prices are asked for property, and operators were so sanguine of another gusher field that oil prices slumped. The field may yet be a big factor in the market, although first results have been disappointing. Sixteen wells are being drilled by the following: Granberry State, 3; H. Hughes, 1; Moonshine Oil Co., 4; W. H. Mitchell, 1; D. R. Beatty, 1; H. Hamilton, 1; Higgins Oil Co., 1; M. Barrett, 1; Wm. Davies, 1; Paraffine Oil Co., 2. Operators were so confident of results that pipe lines to Batson were surveyed, and earthen tankage of over 325,000 is either completed or under construction. Land sells from $1,000 to $6,000 per acre. Whatever may be the result of the operations, it is certainly a fact that the optimistic stories sent out and the resulting drop in crude oil prices are not justified by present conditions.

JEFFERSON COUNTY.

Beaumont.—The market for crude is weak and unsettled, although not much oil is offered. Prices are down to 30 to 35c. in tanks and to 35 to 40c., f. o. b. cars. Water shipments were large the latter part of November, and the total for that month, rail and water, may reach 1,500,000 barrels.

MATAGORDA COUNTY.

Matagorda.—There are six producing wells here, owned as follows: Underwood-Jackson, 1; Langham & Griffith, 2; T. W. Lane, 2, and the daily output is 2,500 bbl.; 6 wells are drilling; oil in store amounts to 35,000 bbl.; oil is selling at 40 cents.

WASHINGTON.

FERRY COUNTY.

Anonymous.—This property, on Belcher mountain, has been bonded and the first payment made.

Copper Key.—The shaft sinking has been stopped, and a new level is being opened. The road being frost hardened, ore shipping will be resumed at once.

Manila.—J. L. Harper has gone to Keller with a gang of men to push work on this mine.

Mountain Boy.—The first shipment of ore by wagon has arrived at Republic for transportation to the Granby smelter, Grand Forks, B. C. On account of the new wagon road being soft after late rains the quantity shipped was small. Late frost has hardened the road, and three teams are engaged hauling to the Republic & Kettle River railway at Republic with increased tonnage. The ore runs about $200 to the 100-lb. sack in value. The lower-grade material is reported to be kept at the mine, to await the building of a smelter at West Fork, about 10 miles distant.

Mountain Lion.—The mine has been closed down and the miners discharged for the reason that the smelters cannot take any more of its ore for the present.

Mountain Lion No. 2.—The annual assessment work on this mine is to be done immediately.

Park and Central.—Good ore is being extracted, and work will be continued at these mines.

Republic Power & Cyaniding Co.—The Bradley Engineering Co., of Spokane, Wash., which purchased the machinery, etc., belonging to the cyaniding and sampling works, has sold the complete cyaniding plant, including the 100-ton leaching tanks, standardizing, gold and other tanks, regnery equipment and a No. 5 Gates crusher, to the Crooked River Mining & Milling Co. for the Hogan mine in the Buffalo Hump district, Idaho, to be shipped to Stites, the northern Pacific terminal of the Buffalo Hump district.

PIERCE COUNTY.

Burnett.—An explosion in this coal mine, at Burnett, on December 8, caused the death of at least 11 miners. Fire-damp is supposed to have been the cause.

FOREIGN MINING NEWS.

AFRICA.

NATAL.

The mines department of Natal reports that the total production of coal in the colony for the month of September was 66,618 tons, an increase of 1,925 tons over September, 1903. The total number of laborers employed was 171 white men, 2,413 negroes and 1,903 East Indians, besides which, 40 white men, 145 negroes and 112 East Indians were employed on dead-work and other unproductive labor. Exports for the month were 1,692 tons, in addition to which 30,843 tons were sold to steamers in the port of Durban.

AUSTRALIA.

NEW SOUTH WALES.

No improvement is shown in the coal trade in New South Wales. The quantity of coal exported during the first nine months of this year amounted to 2,387,929 tons, valued at £1,048,281, and falls short of that for the same period last year by 478,217 tons, and £288,280 in value. The principal decreases occur in the shipments to the west coast of America, and it would seem that the hold on this trade, which has been profitably carried on for a number of years, is being lost. The fall in the price of wolfram has had little effect on the industry in Queensland. A large number of promising deposits have been opened up, and the quantity of wolfram produced during the quarter ended September 30 amounted to 365 tons, valued at £47,240.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—Shipments for the week ending December 3 were as follows, in tons: Granby, 11,370; Mother Lode No. 3, 808; Brooklyn-Stemwinder, 2,170; Sunset, 360; Emma, 891; Senator, 165; Mountain Rose, 66; Athelstan-Jackpot, 90; Skylark, $20; total, 18,940 tons; total for the year to date, 744,631 tons.

BRITISH COLUMBIA—KOOTENAY DISTRICT.

Nelson.—The Canadian Goldfields, Ltd., which, in addition to other Kootenay mines, has a large holding of St. Eugene shares, will declare a dividend of two cents a share this week. A rich strike of gold-copper ore was made last week in the 90-ft. level of La France company's mine, on La France creek.

A report from Ymir states that pay ore has been reached in the 1,000-ft. level of the Ymir mine, a shoot five feet wide having been encountered in the east drift. This ore is now being milled. For some time past all the profits realized from the ore taken from the upper workings have been devoted to prosecuting development at this level, and the present discovery is regarded as of the utmost importance. Mill returns on ore taken from the Porto Rico, on tribute, yielded for a 20 days' run $5,000, and in addition, two car-loads of high-grade concentrate. The mine will be worked throughout the winter by the lessee.

NEW BRUNSWICK.

Maritime Sulphite Co.—The mills of this company, at Chatham, are reported to have been taken over by a syndicate of New England capitalists under the name of the Miramich Pulp & Paper Co., Ltd., with a capital of $300,000.

MINING STOCKS.

(Full quotations on pages 974 and 975.)

New York. Dec. 14.

The cross play in the copper speculation this week would have been considered a novelty had not share values slumped alarmingly. In one day Amalgamated rolled up 280,300 shares by its drop from $68 to $58.50, liquidation that represents nearly 20% of the shares issued, at a discount of about 30% from the high point of December 1. On December 9 there was a recovery to $69.375, but on Monday 231,800 shares sent the price down from $69.50 to $61.50. Anaconda, which ordinarily is a slow seller, exchanged 3,000 shares on one day, when the quotation slipped off from $26 to $22. On Monday, when sales were less than one-half those of December 8, the price rallied to $27.15, only to drop again to $25.50. Tennessee was quite active, selling at $34@$39.75. Greene Consolidated has had a lively time, first registering $32.25@$34.375, ex-dividend of 40c., and later, when stop orders came forward, the price was precipitated to $18.50. Subsequently, however, there was a favorable rally. Montreal & Boston has had a discouraging experience since the suspension of the brokerage firm that had been its support on curb. On December 8 about 81,000 shares were thrown on the market, breaking the price from $3.50 to 37.5c. On December 12 transactions were smaller, and there was a rise to $1.50. Speculation in this stock of late has called for criticism, but it is hoped that other tactics will soon put the market value nearer the $7,500,000 capitalization. British Columbia copper was slated at $6.50@$5.75. United. Heinze's company, sold a few common shares at $10.50. White Knob, of Idaho, is still in the dumps, and sales have been made around 50 cents.

Homestake Gold, of South Dakota, showed a wide fluctuation in price, from $53 to $73, without comment. The regular monthly 25c. dividend will be paid on December 24, and at $73 the stock yields a fraction over 4% per annum.

In the Colorado section, the Cripple Creek stocks have shown renewed strength, led by Elkton Consolidated at 70@74c. on declaration of a 1c. dividend—the first in nearly three years. Isabella moved up to 30c., while Vindicator Consolidated reappeared at 67c., a price that will yield nearly 18% per annum in dividends.

The Comstocks have improved, Ophir advancing to $3.15, Mexican to $1.30, and Consolidated California & Virginia to $1.95.

Sales of Quicksilver, of California, have been made at $2.50 for the common and $6 for the preferred. Standard Consolidated gold is weaker, at $1.70.

Comparatively little has been done in Federal Mining & Smelting, although the common shares fluctuated between $66.50 and $61, and the preferred from $81 to $75. American Smelting & Refining was in fair request, the common moving at $80.50@$75.375, and the preferred at $112.75@$110.

United States Steel attracted some attention, because of large trading and the slump in the common stock from $29.375 to $23.50 and the preferred from $91 to $84. Later there was a substantial recovery.

Boston. Dec. 13.

(*From Our Special Correspondent.*)

As might be expected, the local stock market has been completely demoralized by the unlooked for events of the past week, and prices have suffered materially. A great many stop orders were reached and prices actually melted away at times. Perhaps, when sober sense comes to the front again, the market may become normal and be in accord with actual conditions. At present intrinsic value does not count for much, although the better class of stocks show some resiliency when the pressure is removed. Trading has been on a tremendous scale and last Thursday was the record day as regards the volume of business on the local exchange. To show the power of a certain clique—Lawson largely—Copper Range moved up to $72.50 Thursday and Trinity to $13.62½. The day before, the former sold as low as $64, and Trinity as low as $9. To-night Range closed at $67.75, and the latter at $11, or a trifle below a week ago.

The episode in Greene Consolidated mining Monday, gave the market another bad shock, but not so bad as previously. As might be expected, a pegged stock always gets a bad bump and this was no exception. Whether the break in this stock has caused a change in the ownership of the property is a question, although friends of Col. Greene here say that he owns 51% of the stock, which cannot be wrested from him.. What Thomas W. Lawson is trying to accomplish is not known, and everybody is asking the question. His method of advertising a bear raid and then making good, is opening the eyes of the world. In Amalgamated it is generally expected that the next dividend will be at the rate of 4% per annum, in fact 1% is bid for the next dividend on 10,000 shares, or any part in 10,000 share lots. This was made by a Lawson broker. Greene Consolidated's lowest price here was made to-day at $22. It's highest was $34.37½.

In the break Osceola touched $90, against the recent high price of $98; Isle Royale $20, against $35.50; Amalgamated $62.25, against $82.75; Centennial $24.75, against $33; Atlantic $15.50, against $22.25; Mohawk $50.25, against $57.50; Parrot $26, against $32.75; Utah $40.25, against $47; Allouez $17, against $21; Bingham $32.50, against $38.75; United States $23.87½, against $28.75; Old Dominion $23.87½, against $29; and Shannon $7.75, against $10.75; Other stocks suffered, but not to such an extent, perhaps. Boston Consolidated is off to $6.25. It is likely that this company may be Americanized the same as the Utah Consolidated was. The company is not sending ore to the Bingham smelter for treatment now, and the mines are shut down.

Colorado Springs. Dec. 9.

(*From Our Special Correspondent.*)

This week has been an unusual one on the local exchange. Not for two years has there been the volume of trading equal to that of to-day's. Advances in a great many stocks and a heavier business have marked each day's trading during the week. The interest has not only been in the mines list, but has extended quite generally throughout the prospects and unlisted stocks. Among the mines, Elkton, El Paso, Isabella, Cripple Creek Consolidated and Work have been favorites, while on the prospect list Beacon Hill Ajax and Gold Sovereign have been the most active, over 100,000 shares of Ajax selling to-day.

Cripple Creek having once more gotten down to her old-fashioned way of producing gold—$2,000,000 and over each month—and the general healthy condition of the camp seem to be the causes of the renewed activity in stocks.

Portland has sold during the week for $1.77; Elkton reached 72¾c.; El Paso has been selling around $1.16; Cripple Creek Consolidated advanced from 10½ to 11c.; Work from 10½ to 13c., closing at 12⅝c.; Anaconda from 11 to 14c., but receded to 13½c.; Isabella advanced from 26 to 30c.; Findley sold for 27 cents.

In the prospect list, Beacon Hill Ajax advanced from 3¼ to 5⅛c., and Gold Sovereign from 7½ to 9⅛c. per share.

San Francisco. Dec. 8.

(*From Our Special Correspondent.*)

The market for Comstock shares opened rather dull, but demand increased later in the week, and quite a business was done. Trading in the Tonopah and Goldfield stocks on the old exchange continues to improve.

Some quotations noted for the Comstocks are: Ophir, $3.05; Consolidated California & Virginia, $1.85@$1.90; Mexican, $1.25; Hale & Norcross, $1.20; Best & Belcher, $1.10; Sierra Nevada, 52c.; Caledonia, 44c.; Gould & Curry, 25c. per share.

On the San Francisco & Tonopah exchange business was quite active at first, but fell off towards the close; nevertheless, there was a considerable volume of transactions. Tonopah, of Nevada, sold at $9.15; Montana Tonopah, $1.72; Goldfield Nevada, 61c.; Bullfrog, 55c.; Tonopah Midway, 36c.; Sandstorm, 30c.; Blue Bull, 25c.; Black Ant, 5c. per share.

On the California exchange business in oil stocks was rather better than for some weeks past, and good buying was in evidence. Home sold for 45c.; Independence, 33c.; Monarch, 30c.; California Standard, 16c. The heaviest trading was in Standard and Independence.

Monterey. Dec. 9.

(*From Our Special Correspondent.*)

Preparations for the inauguration celebrations for President Diaz did not allow of much business during the week. Exchange on New York dropped from 206 to 203.75 as a further effect of the proposed monetary reforms, though there were few transactions. In mining stocks there were no sales reported.

COAL TRADE REVIEW.

NEW YORK, Dec. 14.

ANTHRACITE.

The anthracite market continues to be, as it has been for some time past, a weather market, and the cold snap and snow of the past week have stimulated buying of domestic sizes, as might be expected. The wholesale trade is accordingly better, and the local yards are making active demands, as they have to meet the call for coal from their customers. This is large, because domestic buyers generally have been taking matters very easily this fall, partly in the comforting belief that there was going to be a mild winter, and partly also in the feeling of security that coal could be obtained at any time, without any considerable advance in prices. The trade is not at all disturbed, however, as it has been conducted very evenly, and supplies have been, and are, sufficient, though there is no great accumulation of stocks.

The demand for steam sizes is also improving, and prices for those descriptions are, therefore, somewhat firmer.

Coastwise trade is quiet, as shipments to the shoalwater ports are over for the season, and nothing is doing to the Maine ports, where ice has begun to form quite heavily. New York harbor trade has been active, on account of the weather, as noted above, and a good demand is coming from along the Sound. Transportation is fair only, although the snow has not been heavy enough to interfere seriously with the railroads.

In Chicago and other western territory conditions are about the same as in the East. Buying has been stimulated by cold weather, and stocks are being pretty rapidly worked off. The lake trade is over, and some demand for all-rail coal is already manifest. Dock stocks in the upper lake ports are not excessive.

Prices continue unchanged. For domestic sizes, the schedule price, which is strictly adhered to, is $4.75 for broken, and $5 for egg, stove and chestnut, New York harbor delivery. For steam sizes, quotations are about $3 for pea coal, $2.25@$2.50 for buckwheat, $1.45@$1.50 for rice, and $1.30@$1.35 for barley.

Anthracite shipments for November were large, as in October. The quantity reported is 5,124,068 tons, which makes a total for the eleven months ending November 30, of 52,429,378 tons. This is only 2,673,704 tons less than in the corresponding period of 1903, when the total was brought up by the phenomenal shipments in the early months of the year.

BITUMINOUS.

The Atlantic seaboard soft coal trade continues strong. Producers generally are experiencing some difficulty in supplying the demand, and a few claim a shortage of coal. To some extent this situation is due to the slow transportation afforded by railroads just now, and also to the inadequate car supply. Wintry weather also has had its influence on the trade, and the expectation is that the demand will be urgent for some time to come.

In the far East stocks of coal are such as to bring out more inquiries from consumers. In trade along the Sound, orders overlap the supply of coal, creating a situation that is not at all pleasing to shippers. Embargoes have been placed on certain rail shipments as a result of the delay in moving the cars. At New York harbor trade is active, and prices f.o.b., are $2.70@$2.75 per ton for ordinary Clearfield, with prospect of $3 being realized, while the specialties command more money..

Ocean freights from Philadelphia are 65c. to Boston, Salem and Portland; 55c. to the Sound; 75c. to Newburyport; 70c. to Lynn; Bath and Portsmouth.

In West Virginia, and in some parts of Pennsylvania, mining and shipments are still affected by the long continued drought. This causes some delay in transportation, as at many points on the railroads it is difficult to get a sufficient supply of water for locomotives. Snow has fallen recently, but it has not helped the situation, as there has been no opportunity for it to melt, or pass into streams anywhere.

Conditions in the Ohio and Mississippi river trade are peculiar. There has been no coal-boat rise in the Ohio since last July, and, consequently, no river shipments from Pittsburg. This condition, coupled with the coming of the winter, has caused a scarcity of coal in Cincinnati, Louisville, and other cities along the river. There are no signs of more water at present, and it may be necessary to make rail shipments to a considerable extent. On the lower Mississippi, demand has been supplied by shipments of Alabama coal from Greenville. A good deal of this fuel is going to New Orleans.

Birmingham. Dec. 12.

(*From Our Special Correspondent.*)

There is demand for every ton of coal being mined in Alabama, and the production is as heavy now as it has been at any time this year, despite the strike of the union coal miners. Several of the larger consumers of coal, getting their supplies from this district, have their fuel agents constantly in the coal-fields urging steady shipments. The miners' strike is affecting the furnace companies solely, and non-union mines are being called on to furnish the fuel for the furnaces in blast to a certain extent. The production of coal in this State cannot be increased any great amount, unless the union miners return to work. The new men brought into the district are either leaving or are proving shiftless and not doing steady work. The State Mine Inspector is still of the opinion that the total production for this year will exceed that of last year, notwithstanding the strike. There is still considerable Alabama coal being shipped to Mexico by Pensacola. Much coal from the western part of Walker county is being shipped via the Mississippi river into Louisiana and lower Mississippi for use by steamships and on large sugar plantations.

The Raven Coal Company is being organized by E. D. Stone. A shaft is being dug near Horse Creek, in Walker county, and at a depth of 85 ft. it is expected a vein of coal will be struck.

The rumor is widespread in this district that the Tennessee Coal, Iron & Railroad Co. will during the coming year construct a large by-product coke plant, the location to be in the vicinity of Ensley.

There is a strong demand for coke, but very little of it is on the open market in Alabama. The importation of coke from West Virginia is still a matter of considerable consequence.

The number of fatal accidents in coal mines in Alabama has already reached 80. Only 57 men lost their lives through accidents in coal mines last year.

Chicago. Dec. 12.

(*From Our Special Correspondent.*)

Conditions are still unfavorable to the development of a wholesale coal trade that shall meet the hopes of dealers. There has been winter weather generally over Chicago territory for a week, but it has not stimulated business, as it was expected to do. The anthracite market is somewhat better, but not more than the slow and steady growth of previous weeks would cause to be expected. The end of navigation sees dock stores that are already being considerably drawn upon and are not up to the normal in aggregate amount; but the trade expects no shortage if all-rail conditions continue up to present expectations.

The demand for bituminous is so slack as to warrant calling the market dull. At this season there ought to be at least a fair sale for all grades of bituminous. Over-production, in the opinion of many, is responsible for the situation. For Western coals the week has been especially quiet. Eastern shippers are somewhat hampered by railroad conditions yet—this being the case notably with smokeless—but their business continues fair. No demoralization exists, however, in any kind of coal, and in this respect only the market may be said to be better than the market of six months ago.

Cleveland. Dec. 13.

(*From Our Special Correspondent.*)

The coke trade is still the most interesting feature of the Cleveland fuel market. There is a good demand from both furnaces and foundries, and the supply continues to be limited by the drought in the coking region, and the consequent lack of water. Some of the furnaces in the Valleys would have been in operation by now had the supply of coke been more to their liking. The prices have, consequently, held their own on the higher level. There has been good buying of foundry coke at $2.50 to $2.75, the generality of sales being at the higher price. Furnace coke has been bringing $2.25@$2.50 at the oven.

The market for steam coal seems to be on the mend slightly. There has been a good demand for the coal, and some of the mines getting a good run of business are not so prone to cut prices. The market, therefore, is more firmly established, on the quotation of $1.05 to $1.10 at the mine for run-of-mine Ohio and Pennsylvania coal. The demand has come from the heavier consumption of railroads, due to the stress of weather, and from the factories, which are increasing their operations.

The demand for slack is also stiffer, since it is realized that the winding up of the lake trade is shortening the supply. The prices rule at about 50c. for spot shipment, and 60@65c. for contracts.

The lake season is about over for this year. The season started late, and the shippers were constantly running behind, but most of them were able to lessen their shortage by a steady movement, without dickering over the rates of carriage. A few cargoes are still going up.

Pittsburg. Dec. 13.

(*From Our Special Correspondent.*)

Coal.—There is a probability of a coal famine at river points between Pittsburg and Cincinnati. The rivers have frozen in many places, and it is impossible to bring coal down for the local markets, which has resulted in an advance of 1c. a bu. to the retail trade, and another advance may be ordered next week. Cincinanti dealers have representatives here trying to arrange for shipments by rail. Reports from Cincinnati are that yesterday prices were advanced 50c. a ton, and at Covington, Ky., and Newport, Ky., the advance was 75c. a ton. It is reported from Fairmont, W. Va., that 14 mines have been closed in that district for want of railroad cars. An important coal deal was closed here on Saturday. The Pittsburg Coal Co. bought the Blanche and Rachel mines of the Pittsburg-Buffalo Co., situated in this district, in exchange for an acreage of coal adjoining the Bertha mine, of the Pittsburg-Buffalo Co., and a block of stock in the Pittsburg Coal Co. The amount of money represented in the transaction is not made public. In this transaction the Pittsburg-Buffalo Co. renews its contract with the Pittsburg Coal Co. for the handling of its lake coal for a term of three years, and agrees not to make any further developments of its coal properties in the Pittsburg district for a term of years; this eliminates the Pittsburg-Buffalo Co. as an aggressive competitor of the Pittsburg Coal Co. during the life of the agreement. The Pittsburg-Buffalo Co. had plans for opening eight mines, which project will be abandoned for the present.

Connellsville Coke.—Prices are much firmer and higher than a week ago. Furnace coke for prompt shipment is quoted at $2.25@$2.35, and for the first quarter at $2.20@$2.30. Foundry coke for the first half is quoted at $2.50@$2.75, and sales for early shipment are reported to have been made at $3 a ton. A number of idle ovens have been put in operation, and the production for the week was 215,852 tons, compared with 197,160 tons the previous week. The shipments aggregated 9,515 cars, distributed as follows: To Pittsburg and river points, 3,525 cars; to points west of Pittsburg, 4,890 cars; to points east of Everson, 1,100 cars. This was an increase of 819 cars compared with the previous week.

San Francisco. Dec. 8.

(*From Our Special Correspondent.*)

The local market is quiet, with no material change in prices.

For Pacific Coast coals, in large lots to dealers, quotations are: Wellington and New Wellington, $8; Richmond, $7.50; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; white ash, $5.25. For Rocky Mountain coals, also in large lots to dealers, prices named are $8.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside; Colorado anthracite brings $14. For Eastern coal, quotations are largely nominal, supplies being light. Pennsylvania anthracite is $14 and Cumberland $13. For English coal, quotations are, ex-ship: Welsh anthracite, $13; cannel, $8.50; Wallsend and Brymbo, $7.50 per ton.

Foreign Coal Trade.

Exports of coal and coke from the United States for the 10 months ending October 31, are reported as follows:

	1903.	1904.	Changes.
Anthracite	1,803,820	1,963,215	I. 159,395
Bituminous	5,284,948	5,315,381	I. 30,433
Total coal	7,088,768	7,278,596	I. 189,828
Coke	344,903	430,232	I. 85,329
Totals	7,433,671	7,708,828	I. 275,157

Exports of coke were chiefly to Mexico, though some went to Canada. The coal exports were distributed as follows:

	1903.	1904.	Changes.
Canada	5,686,192	5,613,148	D. 73,044
Mexico	668,650	735,975	I. 67,325
Cuba	331,158	401,330	I. 70,172
Other West Indies	179,160	209,330	I. 30,170
France	3,320	10,177	I. 6,857
Italy	41,285	67,616	I. 26,331
Other Europe	21,757	53,916	I. 32,159
Other countries	157,246	187,104	I. 29,858
Totals	7,088,768	7,278,596	I. 189,828

Considerable gains were shown everywhere except in the trade to Canada.

Exports of coal to Canada in detail were as follows:

	1903.	1904.	Changes.
Anthracite	1,781,408	1,936,215	I. 154,807
Bituminous	3,904,784	3,676,933	D. 227,851
Totals	5,686,192	5,613,148	D. 73,044

Canada is, naturally, the largest customer, and is the only country which takes any considerable quantity of anthracite coal.

IRON TRADE REVIEW.

NEW YORK, Dec. 14.

The iron market shows increased strength, and an important feature is that buying is becoming more even, with general advances in almost all lines. Pig iron continues in demand, and furnaces have, for the most part, their capacity taken up for the first quarter of next year, while those foundries which have delayed purchasing, and need iron for immediate use, are finding difficulty in securing spot deliveries. An important point noted is that the United States Steel Corporation has contracted for a quantity of bessemer iron, which will keep the independent furnaces of the Mahoning and Shenango valleys out of the market practically for all the first half of next year.

In finished material there is also a rush to buy in many lines. Prices have been provisionally advanced in several directions, and another series of pool meetings is to be held in New York next week, when these advances will probably be confirmed. The only exception in the increase of orders is in the rail market. There appears to be now no doubt that the $28 price will be continued for next year, but the railroads are still holding back, and none of the usual large orders has been placed as yet.

The cold weather of this week will close late navigation, and even the few scattering cargoes which are on their way down may be held up. It is probable, however, that there is a sufficient stock of ore on hand to keep things moving through the winter, though some of the independent furnaces, which buy their ore, may be dependent on the large companies.

Pig Iron Production.—The reports from the blast furnaces show that on December 1 the weekly capacity of the anthracite and coke furnaces was 357,250 tons, an increase of about 23,000 tons over the report for November 1. Taking the estimates made by the *Iron Age* for the five months from July 1 to November 30, and allowing for charcoal iron production, we find that the output for the five months was approximately 6,735,500 tons. Adding the report of production for the first six months of the year made by the American Iron & Steel Association would bring the output for the eleven months up to 14,908,938 tons of pig iron. This indicates that the total production for this year will be about 1,500,000 tons below that for 1903.

Stocks of unsold iron reported on hand December 1 were 449,500 tons, a decrease of 79,500 tons from November 1. These stocks do not include iron held by the large steel companies for their own use, but represent only the iron which is for sale.

International Steel Agreements.—The latest advices from Europe are that the proposed pool on foreign rail trade by the English, Belgian, German and French makers has been finally concluded and signed. This provides for a division of the export trade among the rail mills of those countries, and for the withdrawal of competition in the trade. The foreign business will be divided in the agreed proportions, and there will be no competition for such orders. It is reported in Germany that negotiations are in progress for an agreement between this international syndicate and the United States Steel Corporation, but nothing definite is known on this point. The report intimates that the foreign mills would make no attempt to secure business in Mexico or South America, provided the American mills would make no competitive offers in European countries. So far, this is a rumor only.

The makers of structural material in Belgium, Germany and France have also concluded an agreement by which foreign business in beams and girders is to be divided among these three countries. The allotments on the basis of a total expected foreign trade of 460,000 tons yearly are 73.45% to German mills, 15.05% to Belgian and 11.50% to French mills. The price agreed upon for foreign business is to be adjusted on the basis of $20.40, f. o. b. Antwerp, for a minimum quantity of 1,000 tons, with increases for smaller orders.

Birmingham. Dec. 12.

(*From Our Special Correspondent.*)

There is a steady demand for pig iron in this section, and the market is strong. The sales are aggregating daily more than the production, and the prospects are already bright for the coming year. Some healthy sales were made during the past week, the United States Cast Iron Pipe & Foundry Co. alone purchasing more than 15,000 tons of iron in this district, delivery during the first three months of the coming year. This business was split up between three or four companies. The quotations in this district are very firm. The announcement made in the north that figures at hand show a rapid increase in the production of iron throughout the country did not have any effect in this district. Inquiry at more than one general office in Birmingham in the last few days elicited the information that there was a strong demand and that prices were steady, with inclination of advancing; No. 2 foundry is holding strong at $13.50, with some sales made at $13.75. It is learned that purchasers were disappointed during the first part of the past week in a failure to obtain iron under $13.50. In some quarters $14 was looked for by the last of the past week, but no sales at that price were recorded up to this morning. There is a large inquiry as to iron and the prospects of production. The make in Alabama shows but little change. The Tennessee Coal, Iron & Railroad Co. has started up No. 3 furnace at Bessemer, making two at that point in blast. This furnace had to be banked two weeks ago on account of the scarcity of labor and also of coke. The Sloss-Sheffield Steel & Iron Co. will not blow in the furnace in the city which was recently repaired, until after the first of the year. The Republic Co. has two furnaces in operation. The new furnace of the Woodward Iron Co. will be ready for the torch shortly, while the Tennessee Co. is collecting labor, it is understood, for the purpose of starting up the new sixth furnace at Ensley.

The following quotations are given: No. 1 foundry, $14@$14.25; No. 2 foundry, $13.50@$13.75; No. 3 foundry, $13@$13.25; No. 4 foundry, $12.25@$12.50; gray forge, $12@$12.25; No. 1 soft, $14@$14.25; No. 2 soft, $13.50@$13.75.

The stocks of iron in the yards in this State are dwindling rapidly. The cast-iron pipe works in Alabama are making the heaviest shipments of their product in the history of the industry in this section. The United States Cast Iron Pipe & Foundry Co. is shipping pipe on the order received from the government for pipe for the Panama water-works system, something like 50 cars being shipped this week from the Anniston and Bessemer plants. The shipments were made via Mobile. The Dimmick Pipe Co., at North Birmingham, also has a number of orders on hand for pipe.

Five rolling mills are in operation in Alabama, and the production of finished iron and steel is good. Two of these mills are small concerns, and the other three mills are not working full force.

Chicago. Dec. 12.

(*From Our Special Correspondent.*)

Firmness continues to characterize the local market for pig iron and finished products. There have been no changes of note from the conditions of last week. The sales of pig iron have been in small quantities, but the aggregate is about the same as in previous weeks. Northern iron is reported to be especially in demand; it brings $16@$17, with most sales probably made at about $16.50. Southern holds at $13.50@$14, Birmingham, or $17.15@$17.65, Chicago. Business is chiefly in deliveries for the second quarter of 1905; there is yet a little scattering business for dealers in Southern in small lots for the first quarter.

Until the first of the year dealers in pig iron expect nothing more than that the trade will hold its own, but after the imaginary line has been crossed there will be continued improvement, according to all the signs. It is apparent that the present market is a solid one, not dependent on a transient, but a steady increase in the demand for iron. One authority on the local market says it is consuming 25% more iron now than it consumed a month ago.

Cleveland. Dec. 13.

(*From Our Special Correspondent.*)

Iron Ore.—There have been no sales of ore. The shipments down the lakes have about stopped, but a few cargoes are on the way down. The demand is good and the consumption heavy. The rates which have been applying on the last cargoes have been 80c. from Duluth; 70c. from Marquette and 65c. from Escanaba. The shipment from Lake docks to furnace is heavy, indicating a steady consumption.

Pig Iron.—Buying of foundry is easing up some, due in a large measure to the shortage of supply among the furnaces. The market is dull. The prices are strong, and the shipments of material from the furnaces are still heavier than the output, indicating that the stocks are rapidly being depleted. Some furnaces have no stocks left, and their shipments are direct. Few furnaces have any iron for December shipment, and most of them have a limited supply for sale for the first quarter. Few if any furnaces are disposed to make any sales past the end of the first quarter, since prices are a little too uncertain for any long time commitments. The market is now established on the basis of $16 at furnaces in the Valley for No. 2 foundry. The southern furnaces are still out of this market. Some small sales to small mills by outside furnaces have been made at $15.50@$16 in the Valleys for first quarter shipment. Basic is off the market for the time being.

Finished Material.—There is still a very good demand for bars. Bar iron has advanced to 1.60c. at the mill, Youngstown, owing to the price of scrap, which this week is $1 to $1.50 higher than a week ago. Some few mills are taking choice orders at 1.55c. Youngstown. The buying of bar steel by finishing mills and agricultural implement works has been good at the old prices. Delivery is generally limited to January 1.

There has been a fairly steady buying of sheets and good specifications against contracts at the new prices, 2.40c. for Nos. 22-24 out of stock, and 2.10c. for the same gauge one-pass cold-rolled, in car-lots at the mill. The outlook is good. Specifications on shapes and plates have been good, but few if any new contracts are coming in. The need is largely among the ship and bridge builders. There has been good buying of billets of the forging quality at a premium.

New York. Dec. 14.

Pig Iron.—There is nothing especially new in the market. Inquiry continues good, but actual buying is confined to small lots for immediate use. There is, however, very little spot iron to be had.

Prices show no material change. We quote for northern iron, large lots, New York harbor delivery, as follows: No. 1 foundry, $17.25@$17.50; No. 2X, $16.75@$17; No. 2 plain, $16.25@$16.50; gray forge, which shows the largest advance, $15.25@$15.50. Virginia basic sells around $16.50. The southern furnaces are refusing to take orders far ahead on current prices, and quotations have all advanced. We quote for southern iron on dock: No. 1 foundry, $17.50@$17.75; No. 2, $17@$17.25; No. 3, $16.25@$16.75; No. 4, $15.75@$16.25; No. 1 soft, $17.25@$17.50; No. 2 soft, $16.75@$17.25; gray forge, $15.25@$15.50. In some cases premiums are said to have been paid for immediate deliveries.

Business in iron warrants on the Produce Exchange has been rather light. The latest quotations are as follows, the first figure being the bid, the second the asked quotation: Cash, $17—$17.40; January, February and March, $17.20—$17.40; April, $17.20—$17.45; May, $17.30—$17.50; June, $17.35—$17.40 per ton.

Bars.—The market is strong. Prices are 1.645c. for bar iron, carload lots, Jersey City delivery. Soft steel bars are 1.545c., same delivery. Store trade is very good, and prices are 1.75@2c., spot delivery.

Plates.—Buying in small lots continues good. We quote for tank plates, ¼ in., 1.545c. in large lots, tidewater delivery. Flange and boiler plates are 1.645c., and marine 1.745c., same delivery.

Structural Material.—Business continues to be principally in small lots. Quotations are unchanged at 1.55@1.65c. for beams, angles and channels.

Steel Rails.—The regular quotation is $28 per ton at mill for large sections, with very little business doing. Light rails continue in demand, and range from $21.50 per ton for 40-lb. rails at mill, up to $24.50 for 16-lb. rails.

Scrap.—Old material continues strong, and demand is active. Most of the yards report light supplies. Machinery cast brings $13@$14 per ton, according to quality. No. 1 wrought, which is in demand, has sold up to $17 and $18, with very little to be had. Heavy steel melting scrap brings $15@$15.50. These prices are on cars, Jersey City, or other terminal deliveries. Material delivered brings about $1.50 more.

Philadelphia. Dec. 13.

(*From Our Special Correspondent.*)

The condition of the iron market, set forth last week, continues without any material modification, except that early deliveries of all kinds of crude iron cannot be had at the same price, and that there is much less iron to be had for delivery during the next three months than even a week ago. The urgent orders for pipe have led to the placing of heavy contracts with furnaces making pipe iron, but these transactions do not directly influence our markets. There is quite a scramble in progress, and furnace managers are obliged to take care of their own customers, not only for now, but for the future. The tone of the market is exceptionally strong, and it is rather difficult to give actual selling prices, because some of the quotations given out are scare quotations and not actual cash. No. 1X foundry is quoted at $17.50@$18; No. 2X foundry, $17; No. 2 plain, $16@$16.50; standard gray forge, $16@$16.50; basic iron, $15.50@$16; low phosphorus, $20.

Billets.—There is almost an hourly expectation of an advance in steel billets, and so far as our smaller consumers are concerned, who are obliged to ask for favors, the price is already advanced to $25.50, with a probability of $26.50, before many days.

Muck Bars.—Muck bars are selling at $28, under arrangements previously entered into, and are quoted at $29 under fresh inquiries.

Bars.—Steel bars have advanced on early deliveries, and a revision of prices officially will shortly be made. Mill people are not accepting orders, excepting where specifications are furnished and fixed deliveries specified. Car building requirements are now very urgent, and some long running contracts are about being placed.

Plates.—A strong market has developed within the past 48 hours, particularly for office building work, boiler-plate work and tank. An advance amounting to $4 per ton has virtually been made on the smaller buyers, and the larger buyers expect that they will have to take medicine of the same kind after the next meeting of the association.

Structural Material.—At last there are some signs that bridge iron will be contracted for in a large way, but most of the material is wanted for western bridges. The inquiries for eastern requirements are quite numerous, but most of them are for moderate quantities.

Scrap.—Our scrap yards are depleted of merchantable scrap, although here and there are small lots that are being held on to for higher prices. Scrap dealers have been obliged to raise their figures to induce holders to part with their stocks, and it now looks as though a further general advance in scrap was unavoidable. Heavy melting scrap has been quoted as high as $14; low phosphorus scrap would bring $18 on sight; iron rails are held at $21; steel rails, $15; car wheels, $14.50 per ton.

Pittsburg. Dec. 13.

(*From Our Special Correspondent.*)

The week has been an unusually active one in iron and steel, particularly the pig iron market. Some surprise was caused in the trade by the United States Steel Corporation entering the market as a buyer. It has bought practically all the available bessemer pig iron capacity of the independent furnaces in the Mahoning and Shenango valleys, up to April 1, 1905. The tonnage, it is now estimated, will amount to over 40,000 tons. The price paid was $15.50@$15.65 a ton at the furnace, or $16.35@$16.50. Pittsburg, and it is doubtful from present indications if iron will sell as low for many months. The bulk of the iron bought was from members of the Bessemer Pig Iron Association, and the rest was sold by W. P. Snyder & Co. The Snyder company is operating but one of its four furnaces at Sharpsville. Another will be blown in on Thursday and a third about January 15. The company will not obtain possession of Mabel furnace, recently purchased, until May 1. In addition to buying outside iron the Steel Corporation soon will be operating all of its blast furnace capacity. The Carnegie Steel Co. has just ordered the two new Donora furnaces to be blown in and, if possible, they will be producing pig iron by the first of the month. There are a number of idle independent blast furnaces, but it is doubtful if they can be operated on account of difficulty in getting ore and coke. J. G. Butler, Jr., chairman of the Bessemer Pig Iron Association, has just issued his official monthly report of furnace conditions. He states that on December 1, there were 191 furnaces tributary to the Lake Superior ore region reporting to the association. Of this number 144 were in blast, representing a daily capacity of 44,085 tons, and 47 were out of blast, representing a daily capacity of 12,797 tons. The increase in the active capacity since November 1 is 3%, and since January 1 of this year, 42½%. There has been a number of small sales of pig iron during the week in addition to the large purchase of bessemer iron by the Steel Corporation and an Ohio cast iron pipe concern has bought over 50,000 tons of northern and southern foundry and forge iron. The buying of small tonnages for early shipment was at sharp advances over all quotations so far made for present or future shipment. The iron trade has so far exceeded the most sanguine expectations and the healthy condition of the market is shown in the fact that all pig iron shipped is going into immediate consumption, except some foundry and forge iron which it is necessary to have in stock at all times.

The steel market is very active and the demand for finished products is increasing rapidly. Much higher prices in all lines are certain to prevail after the opening of the new year and in many lines sales are not being made beyond 30 days. The tin-plate trade is unusually brisk. Official announcement was made yesterday of the starting by the American Sheet and Tin Plate Co., of 37 idle tin-plate mills, leaving but 7 of its 242 mills idle. Of these 5 are at the Sharon works, where 15 mills are running, and 2 are at one of the western plants. Of the 163 sheet mills, 136 are in operation, an increase of 10% over last week. The idle mills will be put in operation as soon as steel can be sent to them. Of

the 111 independent tin-plate mills, all but 37 are in operation, and the idle ones are owned by companies that are not in a position at present to operate them. About a dozen idle independent tin-plate mills were started yesterday. The independent mills cannot sell ahead, because they are not covered on steel and the leading interest will not. This is taken to indicate that a further advance in price is contemplated. Sheets are now selling at a higher price than is named by the big producing company and an official announcement may be expected at any time of a stiff advance. Contrary to custom, the independent wire interests advanced prices first. The American Steel & Wire Co. on Saturday officially announced an increase of $1 a ton, but this is expected to be followed by another before long. Plain wire in large lots was advanced from $31 to $32 a ton, wire nails from $1.70 to $1.75 a keg, and galvanized barb wire from $43 to $44 a ton. The series of steel meetings which are scheduled to open in New York next week are likely to be very interesting and there will be no surprise here if advances are ordered in every line. Actual sales of billets have been made at $25, and sheet bars have sold at fully $4 a ton above the pool price. At the meetings next week an advance of $2 a ton on billets and sheet bars seems certain. Structural shapes and plates are likely to be advanced $4 a ton. Merchant bars will be put up at least $2 a ton and further advances in wire products, merchant pipe and sheets may be ordered before the close of the month.

Pig Iron.—The heavy purchases of pig iron during the week have put the operating merchant furnaces out of the market until April 1, and quotations on all grades continue to advance. The prevailing prices are as follows: Bessemer, $15.75@$16, valley furnace; foundry No. 2, $16.85@$17, Pittsburg, and gray forge $15.85@$16, Pittsburg.

Steel.—Sales of billets and sheet-bars have been made at premiums of from $2 to $4 above the pool price of $21 for bessemer and open-hearth billets and $23 for sheet and tinplate bars. Premiums are being paid for merchant steel bars over the pool price of 1.30@1.35c. and also over the pool price of 1.30@1.40c. for plates.

Sheets.—The market is very active and independent are asking and getting premiums of from $1 to $2 a ton over the price named by the leading producer which is 2.20c. for black sheets and 3.25c. for galvanized.

Ferro-Manganese.—The market is stronger and prices are a trifle higher, domestic 80% being quoted at $42@$43 per ton.

Cartagena, Spain. Nov. 26.

(*Special Report of Barrington & Holt.*)

Iron and Manganiferous Ores.—Exports for the week were one cargo, 2,150 tons, dry ore to Great Britain. There is nothing new to note. The mines in this sierra continue fairly active.

Quotations for iron ores are as follows: Ordinary 50% ore, 6s.@6s. 3d.; special low phosphorus, 6s. 6d.@7s. 3d.; specular ore, 58% iron, 8s. 9d.; magnetic ore, 60%, 10s. 9d. for lumps and 9s. for smalls. For manganiferous ores quotations vary from 9s. 6d. for 12% manganese and 35% iron, up to 14s. 3d. for 20% manganese and 20% iron.

Pyrite.—Iron pyrite, 40% iron and 43% sulphur, is quoted at 10s. per ton. Exports for the week were 300 tons to Marseilles.

Other Exports.—Other exports include 21,000 kg. ocher to Marseilles.

CHEMICALS AND MINERALS.

(See Wholesale Prices Current, page 976.)

NEW YORK, Dec. 7.

Prompt delivery business is small, and the wintry weather has interfered somewhat with transportation. Future contracts continue to be received, especially for the heavy chemicals, and the prices booked intimate an improvement. It cannot come too soon, for manufacturers have had to compete pretty closely to keep their works in profitable operation. Acid makers report an advance of 0.5c. per lb. in nitric, which is justified by the higher cost of raw material. Sulphuric acid contracts for 1905 delivery are being taken on basis of current prices, and it does not look as if a change would be made. The raw material market has quieted down a little, though nitrate of soda has again advanced, and in all probability will continue high priced for months to come. Brimstone is apathetic, foreign quotations being nominal, while domestic producers gain new customers. A forecast is that brimstone may be much cheaper next year, and it seems probable that the Sicilian combination, when its investigations of the Louisiana industry are completed, will adopt some plan for dividing the consuming territory. We shall see. In pyrite, trade is seasonably quiet, though inquiries for future delivery make it appear active. A charter from Huelva, Spain, to Savannah has been fixed at 8s. 9d., free discharge, 1s. taxes, December sailing. This is a slightly lower rate than was quoted a short time ago. Phosphates are not in special demand, because European superphosphate manufacturers are limiting their purchases, hoping to induce miners to shade their prices. In November the exports of Florida high-grade rock through Savannah amounted to 18,198 tons, making a total of 143,877 tons for the 11 months, as against 142,918 tons in the corresponding period of 1903. The bulk of these exports were to Germany.

The consumption of saltpeter in this country during the 11 months ending November 30 amounted to 59,961 bags, as against 64,915 bags in 1903, showing a decrease of 4,954 bags. Stocks held on December 1 were 438 bags, and, adding cargoes on way, makes the visible supply 11,130 bags, which compares with 9,010 bags a year ago.

To curb competition the German Kali Syndicate has decided to reduce the export prices of non-carnallite crude potassium salts, containing 19.9 to 12.4 per cent of potassium, from January 1, 1905. This action, it is believed, will prevent outside works from making further contracts at cut prices, to the detriment of the syndicate. Heretofore the syndicate has maintained somewhat higher prices for export than were quoted on domestic business, and although this policy still rules in certain potassium salts, the five years' agreement made with the American fertilizer combinations suggests that at least one important foreign consuming market will receive preferential rates.

Quotations for wholesale quantities are as below, f. o. b. New York, unless otherwise specified:

Brimstone,	Domestic 2ds, long ton	$21.45
	Domestic, 99.5%, long ton. (For Baltimore and Phila. add 25c.; Portland, 15c.)	21.75
	Foreign 2ds, long ton	21.50@21.75
	Foreign 3ds, long ton	20.75@21.25
Pyrite, Am. 42@44%, lump, unit, at shipping port		10@10½c.
	Am. fines, unit, at shipping port	8½@9c.
	Spanish, 46@52%, lump, unit.	10@11½c.
	Spanish, fines, unit	9@10c.
Nitrate of soda, 95%, 100 lb.	spot.	2.375
	shipments.	2.35@2.375
96%, 100 lb.	spot.	2.40
	shipments.	2.37½@2.40
Sulphate of ammonia, gas liquor, 100 lb.	spot.	3.175
	shipments.	3.225@3.25
Bleaching powder, prime, 100 lb.		1.20@1.25
Cyanide, lb		19@20c.
Copper sulphate, 100 lb		5.125@5.25
Nitric acid, 36°, 100 lb.		5.00
38°, 100 lb.		5.25
40°, 100 lb.		5.50
42°, 100 lb.		5.75
Oxalic acid, com'l, 100 lb.		5.00@5.375
Sulphuric acid, 50°, bulk, ton		13.50@14.50
60°, 100 lb. in carboys.		1.05
60°, bulk ton		18.00@20.00
66°, 100 lb. in carboys.		1.20
66°, bulk ton		21.00@23.00
Phosphate, Fla. rock, 77@80%, f.o.b. shipping port		7.25@ 7.50
Fla. rock, 77@80%, c.if. Europe		10.67@11.85
Fla. land pebble, 68@73%, f.o.b. shipping port		3.75@ 4.00
Fla. land pebble, 68@73%, c.if., Europe		7.70@ 8.40
Tenn. 78@80%, f.o.b., Mt. Pleasant		4.00@ 4.25
Tenn., c.i.fi Europe		10.27@10.67
Tenn., 78%, f.o.b.		3.75@ 4.00
Tenn., 78%, f.o.b.		3.75@ 4.00
Tenn., 75%, f.o.b.		3.25@ 3.50
So. Car., land rock, f.o.b. Ashley River		3.25@ 3.50
So. Car., river rock, f.o.b.		3.00@ 3.25
So. Car., river rock, c.i.f. Europe		6.33@ 6.56
Algerian, 63@70%, c.i.f		7.04@ 7.71
Algerian, 58@63%, c.i.f		6.15@ 6.60
Algerian, 53@58%, c.i.f		5.05@ 5.20
Algerian, 58@63%, c.i.f		6.15@ 6.60
Tunis, c.i.f		6.15@ 6.60
Christmas isle, 80@85%, c.i.f.		13.20@14.03
Ocean isle, 88%, c.i.f.		13.60@14.45

Liverpool. Nov. 22.

(*Special Report of Joseph P. Brunner & Co.*)

Soda ash, in tierces, is about as follows: Leblanc ash, 48%, £5@£5 -0s.; 58%, £5 10s.@£6. Ammonia ash, 48%, £4 5s.@£4 10s.; 58%, £4 10s.@£5 15s. per ton, net cash. Bags, 5s. less. Soda crystals are in steady demand at £3 7s. 6d. per ton, less 5% for barrels, or 7s. less for bags, with special terms for a few favored markets. Caustic soda is in good request and firmly held, as follows: 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76%, £10 10s. per ton, net cash. Special quotations for the Continent and a few other export quarters.

Bleaching powder is pretty active for home consumption, but export demand is limited, and for hardwood the nearest range is about £4 15s.@£5 per ton, net cash, as to market.

Chlorate of potash is quiet, but firm at 3 1-16@ 3 3-16d. per lb., net cash, as to quantity and market.

Bicarbonate of soda is selling at £6 15s. per ton, less 2½%, for the finest quality in 1 cwt. kegs, with usual allowances for larger packages, also special terms for a few favored markets.

Sulphate of ammonia is well maintained at £12 15s.@£12 17s. 6d. per ton, less 2½%, for good gray 24@25% in double bags, f. o. b. here, and there is a good inquiry at the range named.

Nitrate of soda is in moderate demand on spot, with sellers firm at £11 5s. per ton for ordinary, up to £11 10s. per ton for refined, in double bags, f. o. b., here.

METAL MARKET.

New York, Dec. 14.

Gold and Silver Exports and Imports.

At all United States Ports in October and year.

Metal.	October.		Year.	
	1903.	1904.	1903.	1904.
Gold:				
Exports.	$352,177	$3,855,649	$41,889,028	$86,895,557
Imports.	5,026,036	8,005,223	36,666,708	76,699,893
Excess	I. $4,673,859	I. $4,149,574	E. $5,222,320	E $10 195,664
Silver:				
Exports.	3,143,492	3,485,008	28,026,927	42,615,018
Imports.	2,738,158	1,581,163	19,339,427	21,238,394
Excess	E. $405,334	E. $1,923,845	E. $8,687,500	E $21,376,624

These figures include exports and imports at all United States ports; they are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, New York.

For the week ending December 10 and for years from January 1st.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$4,005,000	$216,781	$310,960	$18,762
1904.	100,900,489	6,599,623	33,727,810	1,132,615
1903.	31,812,827	16,041,433	30,783,825	3,265,454
1902.	25,036,292	2,704,328	24,955,641	1,191,344

Of the gold exports this week, London received $2,000,000, and the West Indies the balance; of silver, London took the greater part. Imports were principally gold from France.

Activity in business has received a slight check only from the reaction on Wall street. Business appears generally sound. The question of gold movement is rather puzzling. A sharp advance this week has brought sterling exchange up close to the point where gold exports will be profitable. Such an advance at this season, when cotton and grain bills commonly meet all demands for exchange, is an unusual feature of the market.

The statement of the New York banks—including the 56 banks represented in the Clearing House—for the week ending December 10, gives the following totals, comparisons being made with the corresponding week of 1903:

	1903.	1904.
Loans and discounts	$880,893,800	$1,082,089,400
Deposits	842,855,700	1,118,040,000
Circulation	46,117,300	41,534,100
Specie	152,333,600	211,965,100
Legal tenders	66,458,300	76,910,100
Total reserve	$218,791,800	$288,875,200
Legal requirements	210,713,825	279,510,000
Balance surplus	$8,077,975	$9,365,200

Changes for the week were increases of

$407,600 in circulation, and $826,125 in surplus reserve; decreases of $8,513,500 in loans and discounts, $9,838,100 in deposits, $596,000 in specie, and $1,037,000 in legal tenders.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars, and comparison is made with the holdings at the corresponding date last year:

	1903. Gold.	1903. Silver.	1904. Gold.	1904. Silver.
N. Y. Ass'n..	$152,333,600	.....	$211,965,100	.....
England.....	154,528,525	.....	159,428,565	.....
France.....	477,113,665	$221,393,295	533,735,455	$220,977,465
Germany	163,310,000	57,380,000	185,185,000	65,065,000
Spain	72,640,000	95,060,000	74,390,000	99,845,000
Netherlands	20,642,000	32,138,000	27,645,000	30,618,500
Belgium	16,166,665	8,083,335	16,460,000	8,230,000
Italy	106,580,000	16,676,000	110,900,000	15,831,000
Russia.....	412,715,000	33,415,000	506,610,000	33,375,000
Austria.....	232,910,000	61,030,000	243,390,000	60,700,000

The returns of the Associated Banks of New York are of date December 10, and the others December 8, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The silver market has advanced under the stimulus of a demand to cover December needs. This carried up the price of futures also, but not in quite the same ratio as spot. The price may take a small reaction, but the general undertone of the market is very strong.

The United States Assay Office in New York reports receipts of 61,000 oz. of silver for the week.

Shipments of silver from London to the East for the year up to December 1 are reported by Messrs. Pixley & Abell's circular as follows:

	1903.	1904.	Changes.
India	£6,432,330	£8,901,368	I. £2,469,038
China	310,060	424,723	I. 114,663
Straits	771,879	79,268	D. 692,6110
Totals.....	£7,514,269	£9,405,359	I. £1,891,090

Receipts for the week were £184,000 in bar silver from New York, and £9,000 from Australia; total, £193,000. Shipments were £82,000 in bar silver to Bombay, and £52,001 to Hong Kong; also £66,800 in Mexican dollars to Mexico, *via* New York; total, £200,801.

Indian exchange has been rather easier, the banks in that country being now well supplied with funds. The Council bills offered in London were all taken at an average price of 16.03d. per rupee. The demand for silver on Indian account is only fair, but there is a general belief that the India Council will soon be in the market again for silver for coinage.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars.....	$0.48½	$0.49½
Peruvian soles and Chilean pesos	.43	.45
Victoria sovereigns.....	4.85½	4.87
Twenty franes.....	3.87	3.90
Spanish 25pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

December.	Copper. Lake, Cts. per lb.	Electrolytic, Cts. per lb.	Cathodes, Cts. per lb.	London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
8	14½ @15	14½ @14½	14½ @14½	65	28⅞	4.60	5.80 @5.82½	5.65 @5.67½
9	14½ @15	14½ @14½	14½ @14½	65½	28½	4.60	5.80 @5.82½	5.65 @5.67½
10	14½ @15	14½ @14½	14½ @14½	....	28½	4.60	5.80 @5.82½	5.65 @5.67½
12	14½ @15	14½ @14½	14½ @14½	66½	29	4.60	5.80 @5.82½	5.65 @5.67½
13	14½ @15	14½ @14½	14½ @14½	66	29	4.60	5.80 @5.82½	5.65 @5.67½
14	14½ @15	14½ @14½	14½ @14½	66½	29½ @29½	4.60	5.80 @5.82½	5.65 @5.67½

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire bars.

SILVER AND STERLING EXCHANGE.

December.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	December.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
8	4.8625	59⅞	27⅛	12	4.8645	60⅛	27⅛
9	4.8600	60	27⅛	13	4.8675	60⅛	28
10	4.8615	60	27⅛	14	4.8675	60⅛	28

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver .925 fine.

Copper.—As is to be expected at this time of the year, the market has ruled quiet but steady through the week, and nothing of interest has transpired. The closing quotations are 14¾@15c. for Lake; 14½@14¾ for electrolytic in ingots, cakes and wirebars, 14¼@14½ in cathodes; 14¼@14⅜ for casting copper.

The market for standard copper in London, which closed last week at £65 10s., opened on Monday at £66 5s., declined on Tuesday to £66, and the closing quotations on Wednesday are cabled as £66@£66 2s. 6d. for spot, £66 7s. 6d.@£66 10s. for three months.

Refined and manufactured sorts we quote: English tough, £68 5s.@£68 10s.; best selected, £69 5s.@£69 10s.; strong sheets, £80@£80 10s.; India sheets, £76@£76 10s.; yellow metal, 6½ @6⅝d.

Exports of copper from New York and Baltimore for the week ending December 13 were 4,444 long tons. Imports were 545 tons.

Tin.—There has been quite a display of fireworks in the London market. While last week the closing quotation was cabled as £131 15s. for spot, the market on Monday advanced to £132 10s. On Wednesday, there was a sudden upward movement, culminating in a quotation for spot tin of £136. Three months' tin was quoted at £131, showing a backwardation of £5 and indicating a corner of spot supplies.

Our market over here has, so far, not responded to the manipulations of the London operators. While quite an active business was done last week, trading has become very quiet during the last few days. The closing quotations are rather nominal at 29¼@29⅜ for spot, 28½@28⅝ for futures.

Lead is quiet but steady, without any special feature. The closing quotations are 4.60 New York, 4.52½ St. Louis.

The foreign market is steady, Spanish lead being quoted at £12 15s.@£12 17s. 6d., English lead, £12 17s. 6d.@£13.

St. Louis Lead Market.—The John Wahl Commission Co. telegraphs us as follows: Lead is quiet at the late advance. Missouri brands are selling at 4.50@4.52½c. As high as 4.62½c. has been paid for corroding brands.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of November 26, that the price of silver has been 14.50 reales per oz. Exchange is 34.27 pesetas to £1. The local quotation for pig lead has been 72.25 reales per quintal, which, on current exchange, is equal to £11 15s. 11d. per long ton, f. o. b. Cartagena. Exports of pig lead have been 65,980 kg. desilverized and 250,725 kg. argentiferous lead to Marseilles; 203,200 kg. desilverized to Amsterdam, and 400,000 kg. desilverized lead to Liverpool.

Spelter continues to display considerable strength and the consumptive demand remains quite satisfactory. The closing quotations are given as 5.65@5.67½ St. Louis, 5.80@5.82½ New York.

The foreign market is firm, good ordinaries being quoted at £25, specials at £25 5s.

St. Louis Spelter Market.—The John Wahl Commission Co. telegraphs us as follows: Spelter is a little unsettled, although still very strong. The latest sales reported are on a basis of 5.72½@5.75c., East St. Louis.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of November 26, that activity in zinc ores continues. Miners are taking advantage of the present demand to increase production. Prices are somewhat higher, 74 pesetas being named for blende, 35% zinc, and 53 pesetas for calamine, 30% zinc. Exports for the week were 570 tons blende to London.

Antimony is dull without any special feature. We quote Cookson's at 8¼@8½; Hallett's 8@8¼; United States, French, Hungarian, Italian, Japanese and Chinese, 8@8⅛c. per pound.

Nickel.—Producers quote 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots is higher, according to quantity, running up to 60c. for small orders.

Platinum.—Quotations are firm, at $19.50 per ounce.

Platinum in manufactured forms is higher. Messrs. Eimer & Amend, of New York, quote for different forms, as follows: Heavy sheet and rod, 72c. per gram; foil and wire, 74c.; crucibles and dishes, 78c.; perforated ware, 85c., and cones, $1 per gram.

Quicksilver.—Prices are steady. In New York large lots can be had at $40 per flask, and $41@$41.50 for smaller orders. The San Francisco quotations are $42@$42.50 for domestic orders, and $41 for export. The London price is £7 15s. per flask, with the same figure quoted by second hands.

Minor Metals and Alloys.—Thallium is quoted at 60@65 marks per kg. at Breslau, Germany. Manganese metal is quoted at 360 marks per 100 kg., f. o. b. Bremen, Germany. Manganese tin alloy, 55%, is quoted 365 marks per 100 kg. for first quality and 225 marks for second quality, both f. o. b. Bremen.

For other minor metals and their alloys, wholesale prices, f. o. b. works, are as follows:

	Per lb.		Per lb.
Aluminum,		Ferro-Chrom. (74%)	12½c
No. 1. 99% ingots	33@37c	Ferro-Tungsten (37%)	.45c.
No. 2. 99% ingots	31@34c	Magnesium, pure	
Rolled Sheets	4c. up	(N. Y.)	$1.60
Alum-bronze	20@23c.	Manganese, (98@99%	
Nickel-alum	33@39c.	N. Y.)	75c.
Bismuth	$2.10	Manganese Cu., (30@70%	
Chr'm'm, pure (N. Y.)	80c.	N. Y.)	40c.
Copper, red oxide	50c.	Molybdenum, (98@99%	
Fe.-Molybd'm (50%)	$1.00	N. Y.)	$2.75
Ferro-Titanium (20@25%		Phosphorus, foreign	45c.
N. Y.)	75c.	Phosphorus, American	70c.
Ferro-Vanadium, (25%		Sodium metal	50c.
N. Y.)	$3.00	Tungsten (best)	$1.25

Missouri Ore Market. Dec. 12.

(*From Our Special Correspondent.*)

The highest price paid for zinc ore was $50 per ton, for three bins, $1 per ton higher for these ores than was offered a week ago. A few other scattering advances were made, but not enough to make any material change in the general market price, which remains at $45@$47 per ton of 60 per cent zinc. The feature of the lead market was the advent of a purchasing agent for the St. Louis Smelting & Refining Co., the result of which was an advance of $4 per ton for at least one bin of this ore, an advance of $2 on several bins and $1 per ton all around. Zinc is to-day $16, and lead $10.50 per ton higher than a year ago, and the sales of the week were larger by 1,847 tons of zinc and 370 tons of lead, with an increase in the value of over 100 per cent, the total district value last year being $118,280, against $269,710 this year. The increase for 50 weeks on this year aggregates a gain of 25,000 tons of zinc and 5,000 tons of lead, the value being $1,488,740 greater.

Following are the shipments of zinc and lead from the various camps for the week, with the totals and values for each ore for the 50 weeks ending to-day:

	Zinc. lb.	Lead. lb.	Value.
Joplin.....	3,139,430	379,520	$83,510
Webb City-Carterville	1,534,700	406,800	45,560
Duenweg	1,213,110	234,310	34,660
Galena-Empire.....	803,140	109,290	20,890
Prosperity.....	216,730	291,390	13,730
Alba-Neck.....	546,300	.....	13,390
Badger.....	460,390	.....	11,280
Aurora.....	613,660	9,540	9,700
Oronogo.....	365,640	3,870	8,110
Granby	406,000	62,000	6,900
Carthage	306,050	.....	7,350
Spurgeon-Spring City.	157,420	6,980	3,070
Central City.....	128,160	.....	2,820
Sherwood-Mitchell...	113,770	2,890	2,810
Zincite	97,050	.....	2,140
Beef Branch	71,140	15,720	1,480
Reeds.....	52,070	.....	1,200
Moseley	44,070	8,410	1,110
Totals.....	10,158,970	1,530,770	$269,710
50 weeks.....	501,724,880	64,679,680	$10,636,870
Zinc value, the week,	$222,090;	50 weeks,	$8,870,940
Lead value, the week,	47,620;	50 weeks,	1,765,930

Average Prices of Metals per lb., New York.

Mo.	Tin.		Lead.		Spelter.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan	28.33	28.845	4.075	4.347	4.865	4.863
Feb	29.43	28.087	4.075	4.375	5.043	4.916
Mar.	30.15	28.317	4.442	4.475	5.349	5.057
April	29.81	28.132	4.567	4.475	5.550	5.219
May	29.51	27.718	4.325	4.423	5.639	5.031
June	28.34	26.325	4.210	4.196	5.697	4.760
July	27.68	26.573	4.075	4.192	5.662	4.873
Aug.	28.29	27.012	4.075	4.111	5.725	4.866
Sept	26.77	27.780	4.243	4.200	5.686	5.046
Oct	25.92	28.596	4.375	4.200	5.510	5.181
Nov.	25.42	29.185	4.218	4.200	5.038	5.513
Dec	27.41	.....	4.162	.....	4.731	.....
Year	28.09	.....	4.237	.....	5.400	.....

NOTE.—The average price of spelter in St. Louis for the month of January, 1904, was 4.673c. per lb.; February, 4.717c.; March, 4.841c.; April, 5.038c.; May, 4.853c.; June, 4.596c.; July, 4.723c.; August, 4.716c; September, 4.896c; October, 5.033c; November, 5.363c.

Average Prices of Copper.

Mo.	New York.				London.	
	Electrolytic.		Lake.		Standard.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan	12.159	12.410	12.361	12.553	53.52	57.500
Feb	12.778	12.063	12.901	12.245	57.34	56.500
Mar.	14.416	12.299	14.572	12.551	63.85	57.321
April	14.454	12.923	14.642	13.120	61.72	58.247
May	14.435	12.758	14.618	13.000	61.73	57.321
June	13.942	12.269	14.212	12.399	57.30	56.398
July	13.094	12.380	13.341	12.505	56.64	57.256
Aug.	12.962	12.343	13.159	12.468	58.44	56.952
Sept	13.205	12.495	13.345	12.620	56 82	57.645
Oct	12 801	12.993	12.954	13.118	55.60	60.012
Nov.	12,617	14.284	12.813	14.456	56.30	65.085
Dec	11,952	.....	12,084	.....	56.36	.....
Year	13.235	.....	13.417	.....	57.97	.....

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Mo.	1902.		1903.		1904.	
	London. Pence.	N. Y., Cents.	London. Pence.	N. Y., Cents.	London. Pence.	N. Y. Cents.
Jan	25.62	55.56	21.98	47.57	26.423	57.058
Feb	25.41	55.09	22.11	47.89	26.665	57.592
Mar.	25.00	54.23	22.49	48.72	26.164	56.741
April.	24.34	52.72	23.38	50.56	24.974	54.202
May	23.71	51.31	24.89	54.11	25.578	55.436
June	24.17	52.36	24.29	52.86	25.644	55.673
July	24.38	52.88	24.86	53.92	26.760	58.095
Aug.	24.23	52.52	25.63	55.36	26.591	57.806
Sept	23.88	51.52	26.75	58.00	26.349	57.120
Oct	23.40	50.57	27.89	60.36	26.760	57.923
Nov.	22.70	49.07	27.01	58.11	26.952	58.453
Dec	22.21	48.03	25.73	55.375	.....	.....
Year	24.09	52.16	24.75	53.57	.....	.....

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Company.	Payable.	Rate.	Amount.
†Calumet & Hecla	Dec. 20	$10.00	$1,000,000
Creede United, Col	Dec. 20	.03	15,000
Elkton Con, Col.	Dec. 24	.01	25,000
†Federal, M. & Sm.	Dec. 15	1.50	150,000
†Federal, pf	Dec. 15	1.75	87,500
†General Chem. pf	Jan. 3	1.50	150,000
Greene Con., Mex	Dec. 20	.40	345,600
*Homestake, S. D.	Dec. 24	.25	54,600
Kendall, Mont.	Dec. 10	.10	50,000
‡Maryland Coal, pf.	Dec. 31	2.50	47,125
Maryland Coal, pf., ex.	Dec. 31	2.50	47,125
*Natividad	Dec. 15	5.00	12,000
*N. Y. & Hond. Ros.	Dec. 24	.10	15,000
North Star, Cal	Dec. 23	.35	87,500
St. Eugene, B. C.	Dec. 15	.02	64,040
Stratton's Independ	Dec. 19	.12½	125,001
Tyee, B. C.	Dec. 15	.48	86,400

*Monthly. †Quarterly. ‡Semi-annual.

ASSESSMENTS.

Company.	Delinq.	Sale.	Amt
Albion, Utah	Dec. 6	Dec. 23	.05
Alpha Con., Nev.	Jan. 4	Jan. 20	.05
Beaver-Harrison, U	Dec. 8	Dec. 31	.01
ChallengeCon. Nev.	Dec. 19	Jan. 10	.10
Chollar, Nev.	Dec. 15	Jan. 5	.10
Con. Imperial, Nev.	Dec. 6	Jan. 4	.01
Copper Ranch, U.	Dec. 26	Jan. 16	.00½
Elsie, Utah	Jan. 2	Feb. 12	.04
Exchequer, Nev	Nov. 28	Dec. 20	.05
Julia Con., Nev	Dec. 8	Dec. 29	.03
Justice, Nev	Dec. 5	Dec. 23	.05
Melcher, Ida	Jan. 3	.....	.01
Mexican, Nev	Jan. 10	.....	.15
Monster, Utah	Jan. 4	Jan. 25	.00½
Nevada Park, Utah	Dec. 5	Dec. 22	.00½
Overman, Nev.	Jan. 5	Jan. 24	.10
Ridge & Valley U.	Dec. 28	Jan. 14	.00½
Salt Lake Route, Ex	Dec. 9	Dec. 27	1.00
Savage, Nev	Jan. 6	Jan. 27	.10
Sharp, Utah	Dec. 15	Jan. 5	.00½
Silver-Copper, U.	Dec. 19	Jan. 9	.01
Spider, Ida	Dec. 31	.....	.00½

NEW YORK.

Company.	Par val.	Dec. 7 H.	Dec. 7 L.	Dec. 8 H.	Dec. 8 L.	Dec. 9 H.	Dec. 9 L.	Dec. 10 H.	Dec. 10 L.	Dec. 12 H.	Dec. 12 L.	Dec. 13 H.	Dec. 13 L.	Sales.
Acacia	1	.07	.....	.07	.....	.....	.....	.....	.....	.....	.....	.....	.....	600
Amalgamated	100	77	68½	68	58½	69½	63½	71½	68½	69½	61½	66½	61½	1,311,525
Anaconda	25	109	95	104	98	104	100	107½	104	108½	102	103	100	8,000
Anaconda Gold	5	.....	.....	.....	.....	.12	.11	.....	.....	.12	.....	.12	.....	2,000
Andes	1	.....	.....	.....	.....	.23	.....	.....	.....	.....	.....	.....	.....	500
Argentum Juanita	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.02	.....	1,000
Belcher	3	.....	.....	.....	.....	.....	.....	.22	.....	.....	.....	.....	.....	100
Best & Belcher	3	.....	.....	.....	.....	.....	.....	1.10	.....	.....	.....	.....	.....	200
Breece	25	.....	.....	.....	.....	.16	.....	.....	.....	.....	.....	.....	.....	250
Brunswick	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.10	.....	500
Caledonia	1	.....	.....	.45	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
Challenge	2½	.....	.....	.....	.....	.....	.....	.....	.....	.12	.....	.....	.....	500
Chollar	2½	.....	.....	.....	.....	.16	.....	.....	.....	.....	.....	.16	.....	400
Con. Cal. & Va	2½	1.95	.....	.....	.....	1.85	.....	1.95	1.90	.....	.....	1.95	.....	1,200
Cripple Creek Con.	1	.11	.....	.10	.....	.....	.....	.....	.....	.12	.11	.....	.....	3,000
Elkton Con	1	.72	.71	.....	.....	.74	.73	.....	.....	.70	.....	.70	.....	1,300
Federal Mg. & Sm.	100	66½	64	66	61	66½	65	67	66	.....	.....	66	.....	2,300
Preferred	100	79	78	81	75½	80	78	80	79	79	78	77½	75½	3 900
Gold Dollar	1	.....	.....	.08	.07	.....	.....	.....	.....	.....	.....	.08	.07	4,000
Greene Con.	10	34½	33½	34½	33	34½	32½	34½	33½	34½	21½	25	18½	290,920
Greene Con. Gold	10	13½	12	12½	11½	12½	11½	12	11	11½	8½	9½	7	50,800
Hale & Norcross	3	1.20	.....	1.00	.....	.....	.....	1.10	1.05	.....	.....	.....	.....	600
Homestake	100	.....	.....	.....	.....	53	.....	.....	.....	70	.....	73	.....	120
Isabella	1	.27	.....	.....	.....	.28	.....	.30	.29	.30	.....	.....	.....	4,300
Little Chief	50	.....	.....	.....	.....	.....	.....	.05	.....	.....	.....	.....	.....	200
Mexican	2½	.....	.....	.....	.....	1.30	.....	.....	.....	1.30	.....	.....	.....	300
Mollie Gibson	5	.....	.....	.....	.....	.....	.....	.04	.....	.....	.....	.04	.....	1,500
Moulton	25	.....	.....	.....	.....	.....	.....	.14	.....	.....	.....	.....	.....	100
Occidental	3	.81	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Ontario	100	.....	.....	.....	.....	.....	.....	3.60	.....	.....	.....	.....	.....	30
Ophir	3	2.85	.....	2.80	.....	3.00	.....	.....	.....	.....	.....	3.15	.....	700
Overman	2	.....	.....	.....	.....	.10	.....	.....	.....	.....	.....	.....	.....	300
Pharmacist	1	.04	.....	.....	.....	.....	.....	.....	.....	.04	.....	.....	.....	5,000
Phœnix	1	.13	.....	.15	.....	.11	.....	.....	.....	.....	.....	.....	.....	900
Potosi	1	.17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.17	.....	500
Quicksilver	100	.....	.....	2.50	.....	2.50	.....	2.00	.....	.....	.....	.....	.....	290
Quicksilver pf.	100	.....	.....	6.00	.....	.....	.....	5.00	.....	.....	.....	.....	.....	50
Savage	3	.29	.28	.28	.....	.....	.....	.....	.....	.....	.....	.28	.27	900
Sierra Nevada	3	.52	.50	.....	.....	.50	.....	.....	.....	.52	.....	.....	.....	500
Silver Hill	1	.62	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
Standard	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.70	.....	100
Syndicate	1	.06	.....	.....	.....	.....	.....	.09	.08	.....	.....	.10	.09	1,500
Tennessee C.	25	41	37½	37½	34	39½	37	39	.....	39	34	37½	35½	16,025
Union Copper	10	1½	.....	1½	1½	1½	1½	.....	.....	.....	.....	.....	.....	900
United Copper	100	10	.....	10½	.....	10½	.....	.....	.....	.....	.....	.....	.....	400
Vindicator	1	.....	.....	.....	.....	.....	.....	.....	.....	.67	.....	.....	.....	200
Work	1	.....	.....	.11	.....	.....	.....	.12	.....	.....	.....	.....	.....	2,000
Yellow Jacket	3	.....	.....	.....	.....	.18	.17	.....	.....	.16	.....	.....	.....	600

Total sales, 1,721,510 shares.

SALT LAKE CITY.*

Dec. 3.

Company.	Par Val	High.	Low.	Sales.	Company.	Par Val	High.	Low.	Sales.
Ajax	$1	.14½	.14½	1,000	May Day	$1	.32	.21	96,900
Butler-Liberal	1	.11½	.10½	2,500	N. Y. Bonanza	1	.24	.21	15,575
Carisa	1	.14	.13½	3,000	Petro	1	.07½	.07½	1,000
Century	1	.17	.16	600	Sacramento	5	.10½	.10½	1,000
Con. Mercur	5	.35	.32	700	Silver Shield	1	.13½	.13	10,500
Columbus Con	1	1.35	1.35	65	Star Con.	1	.....	.....	.....
Daly	20	2.30	2.30	100	Swansea	5	.....	.....	.....
Daly-Judge	1	4.75	4.60	150	Tetro	1	.19	.18	1,800
Daly-West	20	12.70	12.50	270	Uncle Sam Con	1	.23½	.23	2,400
Eagle & Blue Bell	1	.90	.90	600	Victoria	1	2.05	2.05	100
Grand Central	1	3.45	3.32½	150	Victor Con.	1	.05½	.05½	500
Little Chief	1	.02½	.02½	66,000	Wabash	1	.....	.....	.....
Lower Mammoth	1	.17½	.15	12,600	Yankee Con	1	.37½	.36½	1,200

*By our Special Correspondent. Total sales, 218,710 shares

BOSTON, MASS.

Company.	Par val.	Dec. 7 H.	Dec. 7 L.	Dec. 8 H.	Dec. 8 L.	Dec. 9 H.	Dec. 9 L.	Dec. 10 H.	Dec. 10 L.	Dec. 12 H.	Dec. 12 L.	Dec. 13 H.	Dec. 13 L.	Sales.
Adventure Con	$25	6½	6	6	5½	6	5½	6½	.....	6	5½	6	5½	1,960
Allouez	25	18½	17½	18	17	18½	18	19½	18½	19	17½	18	17	16,526
Amalgamated	100	75½	68½	68	59	69½	63½	71½	69	69	61½	66½	61	122,625
Am. Z. L. & Sm.	25	12½	12½	12½	.....	13	12½	12½	12½	12½	12½	12½	.....	1,525
Anaconda	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arcadian	25	2	1½	1½	.....	.....	.....	2	1½	2	1½	1½	1½	1,550
Arnold	25	.....	.....	.....	.....	1	.....	.....	.....	1	.....	.....	.....	100
Ash Bed	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Atlantic	25	17½	15½	16½	15	17½	17	18	17½	17½	16	17½	15½	5,850
Bingham Con.	50	36½	34½	34½	33	35	34½	36½	35	35½	33	33½	32½	20,223
Bonanza	10	.80	.75	.....	.....	.75	.....	.....	.....	.....	.....	.....	.....	850
Boston Con	5	7½	7	7½	6½	7	6½	7	.....	.....	.....	7	6½	8,125
Calumet & Hecla	25	665	660	655	.....	665	650	675	670	665	650	650	645	134
Catalpa	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Centennial	25	27½	25½	26	24	27	25½	27½	26½	26	24½	25½	24½	10,765
Con. Mercur	5	.37	.....	34	.....	.33	.....	.33	.....	.38	.37	.....	.....	3,500
Continental Zinc	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Copper Range	100	70½	64½	71	64	72½	69½	71½	70½	70½	66	69½	64½	79,743
Crescent	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Daly-West	20	13½	12½	12½	.....	‡13	12½	13	12½	13½	13	12½	12	1,118
Elm River	12	.....	.....	.....	.....	.....	.....	.....	.....	2½	.....	2½	.....	200
Franklin	25	12½	11	.....	.....	11½	10½	11½	11	12	10½	11	.....	1,572
Granby Con.	10	5½	4½	5½	4½	5½	5	5½	5½	5½	4½	5	4½	23,927
Greene Con	10	34½	33½	34½	33½	‡34½	33	34½	34	34½	23½	25½	22	90,031
Guanajuato Con.	5	3⅛	3⅛	3⅛	....	3⅛	3⅛	3⅛	3⅛	3⅛	3⅛	3⅛	....	3,560
Humboldt	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Isle Royal Con.	25	24	22	24	20	28½	24½	29½	28½	28½	24½	25½	23	17,112
Mass Con.	25	9½	8	8½	8	9½	8½	9½	9½	9½	8½	9	8½	3,555
Mayflower	25	1½	.....	1½	.....	.....	.....	.....	.....	.....	.....	1	.80	650
Michigan	25	9	8½	9	8½	9	8½	10	9	9½	9	9½	9	1,675
Mohawk	25	54	52½	52	50½	53	52½	53½	53	53	51	51	50	2,798
Mont. Coal & C	25	4½	4½	4½	4	4½	4½	5½	4½	5½	4½	5	4½	16,289
National	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1½	.....	50
Old Colony	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1½	.....	250
Old Dominion	25	29	26½	26½	24½	27	25½	28½	27½	26	25½	25½	23½	6,275
Osceola	25	97	92½	93	90	94½	93	95½	94½	94½	90	93	89	4,426
Parrot	10	29½	28	27	25½	28	26½	.....	.....	28	27	26½	25½	2,210
Phœnix Con.	25	3	.....	3	2½	.....	.....	3	.....	3	.....	2½	.....	595
Quincy	25	110	105	100	99	110	.....	.....	.....	111	110	108	105	248
Rhode Island	25	.....	.....	1½	.....	.....	.....	2	.....	.....	.....	1½	.....	580
Santa Fe	10	2½	2	2½	2½	2½	2½	2½	.....	2½	2½	2½	2½	1,895
Shannon	10	9	8½	8½	6½	8½	8½	9½	8½	9	8	8½	8	19,949
Tamarack	25	122	.....	120	.....	120	.....	122	.....	122	120	118	115	291
Tecumseh	25	.....	.....	3	.....	3	.....	.....	.....	.....	.....	.....	.....	660
Tennessee	25	.....	.....	37½	35	38½	37	39	.....	38½	.....	.....	.....	1,825
Trinity	25	11½	9½	12½	9	13½	12	14	13½	13	11½	11½	10½	38,272
Union	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
United States	25	27½	25½	26½	24½	26½	25½	26½	26½	26½	24	24½	23½	53,582
U. S. Coal & Oil	25	11½	11½	11½	10½	11	10½	11½	11	11	.....	11½	10½	2,435
Utah Con	5	44½	43½	43½	40	44	42½	44½	44½	44	41½	42½	40½	29,624
Victoria	25	4½	.....	4½	4½	4½	.....	5	.....	4½	4½	4½	4	810
Winona	25	11	10	11	10	11½	11	12½	12	12	11	11½	10½	4,667
Wolverine	25	107	105	105	104	106	104	106	105	105½	105	105	.....	1,003
Wyandot	25	.....	.....	2½	2	2	1½	2½	2	2	.....	2	.....	1,540

Total sales, 607,150 shares.

COAL, IRON AND INDUSTRIAL STOCKS.

Company.	Par val.	Dec. 7 H.	Dec. 7 L.	Dec. 8 H.	Dec. 8 L.	Dec. 9 H.	Dec. 9 L.	Dec. 10 H.	Dec. 10 L.	Dec. 12 H.	Dec. 12 L.	Dec. 13 H.	Dec. 13 L.	Sales.
Allis-Chalmers	$100	17½	.....	16½	15	17½	16½	18½	18	17½	16½	16	.....	2,400
Allis-Chalmers pf.	100	68½	68	.....	.....	.....	.....	.....	.....	.....	.....	61	59	500
Am. Agri. Chem	100	.....	.....	.....	.....	.....	.....	23½	23	.....	.....	.....	.....	300
Preferred	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Am. Sm. & Ref.	100	81½	77½	80	75½	80½	79	81½	80½	80½	77	79	75½	88,015
Preferred	100	113	111½	111½	110	111½	111	112½	112	112½	111½	112	111½	4,780
†Cambria Iron	50	.....	.....	.....	.....	47½	.....	.....	.....	.....	.....	.....	.....	7
†Cambria Steel	50	25½	25½	25½	24½	25½	25	25½	25½	25½	25	25	24½	9,005
Col. Fuel & Iron	100	55½	48½	48½	47	48	43½	49½	49	47½	42	44½	40½	164,125
Col. Fuel & Iron pf	100	92	.....	91½	.....	.....	.....	.....	.....	90	.....	.....	.....	625
Col. & H. C. & I	100	18½	17½	17½	16	18½	16½	18½	18½	18½	16½	16½	16½	6,250
General Chem.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
General Chem. pf.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
†Lehigh C. & N.	50	107	105	106	105	113½	105	115	109	107	103	105	100	14,370
*Mong. R. Coal	100	10½	.....	.....	.....	.....	.....	.....	.....	10½	.....	.....	.....	195
*Mong. R. Coal pf.	100	30½	30	30	29	.....	.....	30	.....	30	.....	29½	.....	1,180
National Lead	100	24½	23½	24½	22	23½	22½	24	23½	22½	22½	23	22	5,500
Preferred	100	.....	.....	.....	.....	.....	.....	.....	.....	96½	.....	.....	.....	100
†Phila. Nat. Gas.	50	41½	41	41	40½	41½	40½	42½	41½	42	41	41½	41	6,280
Preferred	50	.....	.....	47	.....	47½	47	.....	.....	.....	.....	46½	45½	231
*Pittsburg Coal	100	26½	24½	24½	22	23½	23	24½	23½	25	23½	23½	22½	15,628
Preferred	100	84½	82½	82½	77½	81½	80½	81½	81½	82	80½	80½	80	10,079
Republic I. & S	100	16½	15	15½	14	16½	14½	16½	16½	16½	15½	15½	14½	19,900
Preferred	100	70	67½	67½	65	68½	67	69	68½	69½	66	67	65½	9,900
Sloss-Shef. S. & I	100	61	60	59½	57	60	59½	61	60	61	60	59½	58½	4,500
Preferred	100	.....	.....	.....	.....	.....	.....	.....	.....	102	.....	102	.....	300
Standard Oil	100	642	637½	638	634	640	636	.....	.....	637	634	630	625	352
Tenn. C. I. & R.R.	100	74½	70½	70½	61½	71½	67½	73	71	71½	65½	67½	63	86,400
U. S. Steel Corp	100	31½	29½	29½	23½	29½	27	30½	29½	30½	26½	28½	25	330,515
Preferred	100	93½	90½	91	84	91½	87½	92½	90½	91½	87½	88½	84½	1,130,201
Va.-Car. Chem	100	43	41	40	38	41½	40	42½	41½	41	39½	40	39½	12,945
Preferred	100	113½	111½	110½	110	113½	.....	.....	.....	112	111½	111	110	1,920

*Pittsburg Exchange; †Philadelphia Exchange; all others, New York Stock Exchange.

Total sales, 2,926,503 shares.

STOCK QUOTATIONS.

SAN FRANCISCO.*

Company.	Location.	Dec. 1 H.	Dec. 1 L.	Dec. 2 H.	Dec. 2 L.	Dec. 3 H.	Dec. 3 L.	Dec. 5 H.	Dec. 5 L.	Dec. 6 H.	Dec. 6 L.	Dec. 7 H.	Dec. 7 L.	Sales.
MacNamara	Nev.	.23	....	.22	....	.22	....	.22	....	.22	....	.23	....	16,850
Mont. Tonopah	Nev.	1.70	....	1.70	....	1.70	....	1.70	....	....	....	172½	1.72	2,070
Ton. Belmont	Nev.	.72	.71	.75	.72	....	....	.77	.75	....	....	....	....	4,600
Ton. Midway	Nev.	.33	....	.35	.34	.35	....	....	....	.36	....	.36	.35	8,300
Tonopah	Nev.	9.50	....	962½	....	9.75	....	9.75	....	....	....	9.75	....	780
Ton. North Star	Nev.	.25	.20	.25	.23	.25	.24	.26	.23	.25	.23	.24	.23	25,450

*San Francisco & Tonopah Exchange. Total sales, 58,050 shares.

SAN FRANCISCO (By Telegraph).

Company.	December. 12	December. 13	Company.	December. 12	December. 13
Belcher	$0.22	$0.21	Gould & Curry	$0.24	$0.23
Best & Belcher	1.10	1.10	Hale & Norcross	1.10	1.10
Caledonia	.44	.45	Mexican	1.30	1.30
Challenge Con.	.15	.14	Ophir	3.25	3.75
Chollar	.15	.26	Overman	.09	.09
Confidence	.85	.85	Sierra Nevada	.51	.51
Con. California & Virginia	1.85	1.85	Union Con	.61	.61
Crown Point	.15	.14	Yellow Jacket	.16	.15

COLORADO SPRINGS (By Telegraph).

Company.	Dec. 12 H.	Dec. 12 L.	Dec. 13 H.	Dec. 13 L.	Company.	Dec. 12 H.	Dec. 12 L.	Dec. 13 H.	Dec. 13 L.
Anaconda	.14	.13	.13¼	.12¾	Jack Pot	.08½	.06¼	....	....
C. K. & N.	.22	.20	....	....	Last Dollar	....	....	....	....
Cripple Ck. Con.	.11	.10½	.10⅜	.10½	Mollie Gibson	.04¼	.04⅜	.04¼	.04⅜
Doctor Jack Pot	.06	.05½	.05⅜	.04⅜	Moon Anchor	.06⅜	.06¼	.06⅜	.05⅜
Elkton Con	.71⅜	.70⅜	.70½	.69	Old Gold	.08¼	.08⅛	.09	.08⅛
El Paso	1.16	1.15½	1.15½	....	Pharmacist	.04	.03¾	.04⅛	.03⅝
Gold Dollar	.07½	.07	.07½	.06½	Portland	1.76	1.74	1.90	1.73
Gold Sovereign	.09½	.09½	.08¾	.08¾	Vindicator Con	.68	....	....	....
Isabella	.27⅜	.27⅜	.27	.26	Work	.12½	.12¼	.13	.12¼

ST. LOUIS, MO.* Dec. 10.

Company.	Par Val.	Bid.	Ask.	Company.	Par Val.	Bid	Ask.
Am. Nettie, Colo	$10	$0.20	$0.25	Columbia Lead, Mo.	$10	$0.25	$1.90
Center Creek	10	1.40	2.00	Con. Coal, Ill	100	11.00	16.00
Central Coal & C.	100	60.00	62.50	Doe Run Lead, Mo.	100	110.00	115.00
Central C. & C., Pf	100	70.00	72.50	Granite Bimet., Mont.	10	.34	.38
Central Lead, Mo.	100	110.00	115.00	St. Joe Lead, Mo	10	14.00	16.00

*By our Special Correspondent.

DULUTH, MINN. Nov. 26.

Company.	Par Val.	Bid.	Ask.	Company.	Par Val.	Bid.	Ask.
Black Mountain	$1	$1.10	$1.25	Lake Sup. & Pitts	$10	$45.00	$46.00
Calumet & Arizona	10	105.00	110.00	Pitts. & Duluth	15	25.50	26.00
Calumet & Pittsburg	10	45.00	45.50	Shakespeare	1	....	.20
Houghton Develop.	10	6.00	7.00	United Mexican	10	....	.25
Junction Development	15	74.00	75.00	Wolverine & Arizona	10	....	6.50

MONTREAL.* Dec. 10.

Company.	Par Val.	High	Low	Sales	Company.	Par Val.	High	Low	Sales
Dominion Coal	100	67.00	63.00	850	Montreal Steel	100	....	....	....
Dom. Coal, Pf	100	119.00	116.00	409	Mont'l Steel, Pf	100	99.00	....	50
Dom. I. & St	100	19.25	17.75	3,844	Nova Scotia St.	100	69.12½	66.00	1,795
Dom. I. & St., Pf.	100	60.00	49.75	2,169	N. S. Steel, Pf	100	110.00	....	10

*Montreal Stock Exchange. Total sales, 9,127 shares.

MEXICO. Nov. 25

Company.	Shares Issued	Prices, Mex. Bid.	Prices, Mex. Ask.	Company.	Shares Issued	Prices, Mex. Bid.	Prices, Mex. Ask.
DURANGO:				Soledad, aviada	$670	$1,200	$1,250
Ca. Min. de Penoles	2,500	$2,600	$3,000	Sorpresa, aviada	960	240	350
San Andres de la Sierra	200	10,000	....	MEXICO:			
GUANAJUATO:				Aldebarren	2,000	62	68
Cinco Senores y An. aviadoras	2,000	30	35	Buen Despacho	3,000	65	72
Cinco, Senores y An. aviada	400	30	35	Dos Estrellas	3,000	3,700	3,750
Providencia, San Juan de la Lus.	6,000	138	142	La Esperanza (El Oro)	3,000	1,500	1,500
GUERRERO:				Santa Ana, Esperanza	2,400	15	30
Garduno y Anexas	7,200	30	35	NUEVO LEON:			
HIDALGO:				La Fraternal	1,000	580	620
Amistad y Con.	9,600	71	72	Norias de Bajan	1,000	500	600
Carmen, aviada	1,100	220	240	SAN LUIS POTOSI:			
Guadalupe Fresnillo Mill	1,000	170	200	Concepcion y An	3,000	45	65
Guadalupe Fresnillo Mine	1,400	70	80	El Barreno, aviadora	2,000	90	95
Maravillas y An., aviador	1,680	90	110	Sta. Maria de la Paz	9,600	246	249
Maravillas el Lobo	1,000	130	180	ZACATECAS:			
Refugio, aviada	12,800	5	7	Asturiana y An	2,500	10	15
Sta. Gertrudis y An. aviadas	9,600	10	12	Candelaria y Pinos	2,500	40	50
Sta. Gertrudis y An. aviadora	28,800	76	76½	San Carlos y Anexas	2,500	35	45
San Rafael y An., Trompillo	1,200	2,350	2,400	Sta. Maria de Gaud.	2,500	100	105
San Rafael y An., aviada	1,200	750	790	MISCELLANEOUS:			
				Bartolome de Medina	2,000	99	100
				Naica (Chihuahua)	100	11,000	13,000
				Natividad (Oxaca) aviadora	1,800	870	980
				San Francisco Hac.	6,000	76	300
				Union Hacienda	3,000	360	

LONDON. Dec. 1

Company.	Shares Issued.	Par value. £	s.	d.	Latest dividend. Amt. s.	d.	Date.	Quotations. Buyers. £	s.	d.	Sellers. £	s.	d.
American:													
Alaska-Treadwell	200,000	5	0	0	4	0	Oct., 1904	4	15	0	5	0	0
Anaconda	1,200,000	5	0	0	2	0	Nov., 1904	5	16	3	5	18	9
Camp Bird	820,000	1	0	0		9	Nov., 1904	1	8	6	1	9	0
Copiapo	112,500	2	0	0	5	0	Oct., 1904	1	0	0	1	5	0
De Lamar	80,000	1	0	0	2	0	Nov., 1904		15	0		17	6
El Oro	1,080,000	1	0	0		9	July, 1904	1	0	0	1	2	6
Frontino & Bolivia	140,000	1	0	0		rts.	Mar., 1904		9	6		10	6
Le Roi	200,000	5	0	0	5	0	Nov., 1899		12	6		15	0
Le Roi No. 2	120,000	5	0	0	1	0	June, 1904	1	2	6	1	5	0
Mesquital	250,000	1	0	0		3	Feb., 1903		2	6		3	0
*Palmarejo & Mexican	445,000	1	0	0		3	Nov., 1904		9	0		9	6
Standard	500,000		4	0		1⅛	Sept., 1903		1	0		2	0
Stratton's Independence	1,000,007	1	0	0		6	Dec., 1904		6	0		6	6
St. John del Rey	546,265	1	0	0		6	Dec., 1904		13	6		14	6
Tomboy	300,000	1	0	0	1	0	June, 1902	1	5	0	1	7	6
Ymir	200,000	1	0	0	1	0	Mar., 1902		3	9		6	3
European:													
Linares	15,000	3	0	0	5	0	Sept., 1904	4	0	0	4	5	0
Mason & Barry	185,172	1	0	0	7	0	May, 1904	3	2	6	3	7	6
Rio Tinto	325,000	5	0	0	32	6	Nov., 1904	61	15	0	62	0	0
Rio Tinto, preferred	325,000	5	0	0	2	6	Nov., 1904	6	2	6	6	7	6
Tharsis	625,000	2	0	0	7	0	May, 1904	5	1	3	5	3	9
West Australian:													
Associated	495,388	1	0	0	2	6	July, 1904	1	17	6	2	0	0
Cosmopolitan	400,000	1	0	0	1	0	Apr., 1904		6	0		6	6
*Golden Horseshoe	300,000	5	0	0	6	0	Nov., 1904	7	5	0	7	7	6
Great Boulder	1,750,000		2	0		9	Dec., 1904	1	2	6	1	3	0
Gt. Boulder Persever'ce	1,400,007	1	0	0	1	0	Sept., 1904		12	3		12	9
Great Fingall	250,000	1	0	0	7	0	Oct., 1904	8	2	6	8	5	0
Ivanhoe	200,000	5	0	0	5	0	Oct., 1904	8	0	0	8	2	6
Kalgurli	120,000	1	0	0	2	6	Jan., 1905	6	7	6	6	10	0
Lake View	250,000	1	0	0	1	6	Oct., 1904	1	2	6	1	5	0
Oroya-Brownhill	450,000	1	0	0	4	0	Dec., 1904	3	12	6	3	15	0
Miscellaneous:													
Brilliant Central	100,000	1	0	0	1	0	Nov., 1904	1	2	6	1	7	6
Briseis	600,000	1	0	0	....	....	....		10	0		11	0
*Broken Hill	960,000		8	0	1	0	Nov., 1904	2	3	0	2	4	0
Mt. Lyell	1,200,000	3	0	0	1	3	Dec., 1904		17	0		18	0
Mt. Morgan	1,000,000	1	0	0		3	Dec., 1904	2	12	6	2	15	0
Waihi	497,412	1	0	0	2	6	Dec., 1904	5	18	9	6	1	3
Indian:													
Champion Reef	2,000,000		10	0	1	4	Sept., 1904	1	14	6	1	15	6
Mysore	580,000		10	0	4	6	Nov., 1904	6	8	9	6	11	3
*Nundydroog	484,000		10	0	1	6	Nov., 1904	1	13	6	1	14	6
Ooregum	683,000		10	0		9	Dec., 1904		18	0		19	0
Ooregum, pfd	240,000		10	0		9	Dec., 1904	1	6	3	1	8	9
South African:													
Angelo	600,000	1	0	0	7	0	Aug., 1904	7	3	9	7	6	3
Bonanza	200,000	1	0	0	8	0	Aug., 1904	1	5	0	1	7	6
British South Africa	4,568,392	1	0	0		rts.	May, 1899	2	4	1	2	5	3
Cape Copper	300,000	2	0	0		6	Jan., 1905	4	12	6	4	15	0
Cape Copper, pfd	45,000	2	0	0		6	Jan., 1905	4	0	0	4	5	0
City & Suburban	340,000	4	0	0	4	0	Aug., 1904	6	2	6	6	5	0
Consol. Gold-Fields	2,000,000	1	0	0	2	6	Dec., 1904	7	18	9	8	0	0
Crown Reef	120,000	1	0	0	18	0	Nov., 1904	15	0	0	15	10	0
De Beers, preferred	800,000	2	10	0	10	0	Aug., 1904	18	6	3	18	8	9
De Beers, deferred	1,000,000	2	10	0	12	6	Aug., 1904	18	7	6	18	10	0
East Rand	990,000	1	0	0	5	0	July, 1903	9	2	6	9	3	9
Ferreira	95,000	1	0	0	22	6	Aug., 1904	22	15	0	23	0	0
Geldenhuis	200,000	1	0	0	5	0	Aug., 1904	5	16	3	5	18	9
Geduld	400,000	1	0	0		rts.	Mar., 1902	7	11	3	7	12	6
Henry Nourse	125,000	1	0	0	8	0	Aug., 1904	8	5	0	8	10	0
Jubilee	50,000	1	0	0	5	0	Aug., 1904	3	12	6	3	17	6
Jumpers	100,000	1	0	0	2	6	May, 1904	2	7	6	2	12	6
Langlaagte	470,000	1	0	0	2	0	Aug., 1904	4	1	3	4	3	9
May	288,750	1	0	0	3	0	Aug., 1904	4	2	6	4	5	0
Meyer & Charlton	100,000	1	0	0	5	0	Aug., 1904	5	10	0	5	15	0
Modderfontein	290,000	1	0	0	rts.		Apr., 1902	10	16	3	10	18	9
Namaqua	94,331	2	0	0	3	0	Dec., 1904	3	13	9	3	16	3
New Jagersfontein	200,000	5	0	0	15	0	Dec., 1904	28	7	6	28	12	6
New Primrose	325,000	1	0	0	3	0	Aug., 1904	3	10	0	3	12	6
Rand	1,795,956		5	0	5	0	Aug., 1904	11	10	0	11	12	6
Robinson	550,000	5	0	0	6	0	Aug., 1904	10	5	0	10	10	0
Robinson Deep	950,000	1	0	0	3	0	Aug., 1904	5	13	9	5	16	3
Rose Deep	425,000	1	0	0	3	0	Aug., 1904	8	15	0	9	0	0
Salisbury	100,000	1	0	0	2	0	Dec., 1904	2	2	6	2	5	0
Village Main Reef	400,000	1	0	0	4	0	July, 1904	7	5	0	7	10	0
Wemmer	80,000	1	0	0	12	6	Dec., 1904	10	10	0	11	0	0

*Ex-dividend.

LONDON (By Cable).*

Company.	Dec. 7 £	s.	d.	Dec. 14 £	s.	d.	Company.	Dec. 7 £	s.	d.	Dec. 14 £	s.	d.
Camp Bird	1	8	9	1	8	6	Esperanza	....	18	9	1	0	0
Con. Gold Fields	8	1	3	7	18	9	Modderfontein	10	18	9	10	11	3
DeBeers	18	10	0	18	2	6	Rand Mines	11	11	3	11	8	9
Dolores	1	7	9	1	7	9	Rio Tinto	62	15	0	60	3	9
East Rand	9	1	10½	8	19	4½	Simmer & Jack	2	8	9	2	8	1½
El Oro	1	2	6	1	2	6	Tomboy	1	8	1½	1	7	6

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS.

Company.	Location.	Capital Stock. Francs.	Par value. Fr.	Latest dividend. Fr.	Prices. Opening. Fr.	Prices. Closing. Fr.
Anzin, Coal	France	....	....	290.00	5,725.00	5,710.00
Boleo, c	Lower Cal.	12,000,000	500	104.17	2,245.00	2,260.00
Champ d'Or, g	S. Africa	3,375,000	25	3.75	16.75	16.75
Courrieres, Coal	France	600,000	500	110.00	2,910.00	2,949.00
Fraser River, g	Brit. Col	250,000	25	....	5.50	5.50
Huanchaca, s	Bolivia	40,000,000	125	2.50	92.75	93.75
Laurium, z. l	Greece	16,300,000	500	25.00	309.00	309.00
Malfidano, z	Italy	12,500,000	500	50.00	625.00	630.00
Metaux, Cie. Fran. de	France	25,000,000	500	22.50	510.00	505.00
Mokta-el-Hadid, i. l	Algeria	18,312,000	500	40.00	1,022.00	1,010.00
Nickel, n	N. Caledonia	15,000,000	250	22.50	639.00	610.00
Penarroya, Coal	Spain	....	500	45.00	1,130.00	1,136.50
Vielle Montagne, z	Belgium	9,000,000	30	30.00	778.00	778.00

c—Copper. g—Gold. i—Iron. l—Lead. n—Nickel. s—Silver. z—Zinc.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—		
Bort as to size	carat,	$10.00@$18.00
Carborundum, f.o.b. Niagara Falls, Powd.	lb.	.08
Grains	"	.10
Corundum, N. C.	"	.07@.10
Chester, Mass	"	.04½@.05
Craigmont, Ont.	"	.05½@.06½
Mont. f.o.b. Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, in kegs: Turkish flour	"	.03½
Grains	"	.05@.05½
Naxos flour	"	.03½
Grains	"	.05@.05½
Chester flour	"	.03½
Grains	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½
Grains, in kegs	"	.02½
Crude, ex-ship N. Y.: Abbott (Turkey)	lg. ton	26.50@30.00
Kuluk (Turkey)	"	22.00@24.00
Naxos(Greek)h.gr	"	26.00
Garnet, per quality	sh. ton	25.00@35.00
Pumice Stone, Am. Powd	lb.	.01½@.02
Italian, powdered	"	.01½
Lump, per quality	"	.04@.05
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg	"	.07
ACIDS—		
Boracic, crystals	"	.10
Powdered	"	.10½
Carbonic, liquid gas	"	.12½
Chromic, crude	"	.19
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Sulphurous, liquid anhy. f.o.b. Bound Brook, N. J.	"	.06
ALCOHOL—Grain	gal.	2.40@2.42
Refined wood, 95@97%	"	.60@.65
Purified	"	1.25@1.30
ALUM—Lump	100 lb.	1.75
Ground	"	1.85
Porous	"	.90
Powdered	"	3.00
Chrome, com'l	"	2.75@3.00
ALUMINUM—		
Nitrate	lb.	1.50
Oxide, com'l, common	"	.06½
Best	"	.20
Pure	"	.80
Hydrated	100 lb.	2.60
Sulphate, com'l	"	.75@1.25
AMMONIA—		
Aqua 16°	lb.	.03½
18°	"	.03½
20°	"	.03½
26°	"	.04½
AMMONIUM—		
Carbonate, lump	"	.07½
Powdered	"	.08½
Muriate grain	"	.05½@.05½
Lump	"	.09½
Nitrate, white pure (99%)	"	.12
Phosphate, com'l	"	.09
Pure	"	.12
ANTIMONY—Glass	"	.30@.40
Needle, lump	"	.05½@.06
Powdered, ordinary	"	.05½@.07½
Oxide, com'l white, 95%	"	.09½
Com'l gray	"	.07
Sulphuret, com'l	"	.16
ARSENIC—White	"	.03@.03½
Red	"	.06½@.06½
ASPHALTUM—		
Barbadoes	bbl.	.30
Cuban	lb.	.01½@.03½
Egyptian, crude	"	.06@.07
Gilsonite, Utah, ordin'y.	"	.03
Select	"	.03½
San Valentino (Italian)	lg. ton	16.00
Seyssel (French), mastic	"	21.00
Trinidad, refined	"	35.00
Ventura, Cal	"	32.00
BARIUM—		
Carb. Lump, 80@90%	sh. ton	25.00@27.00
92@98%	"	26.00@29.00
Powdered, 80@90%	lb.	.01½@.02
Chloride, com'l	100 lb.	1.25
Chem. pure cryst	lb.	.05
Nitrite, powdered	"	.05
Sulphate (Blanc Fixe)	"	.02
BARYTES—		
Am. Crude, No. 1	sh. ton	9.75
Crude, No. 2	"	8.00
Crude, No. 3	"	7.00
Snow-white	"	15.00@15.50
Floated	"	15.75@16.00
Foreign gray	"	13.50
Snow-white	"	17.25
Floated	"	18.75
BAUXITE—Ga. or Ala. Mines:		
First grade	lg. ton	5.25@5.50
Second grade	"	4.50@4.75
BISMUTH—Subnitrate	lb.	2.45
Subcarbonate	"	2.70
BITUMEN—"B"	"	.03½
"A"	"	.05
BONE ASH	"	.02½@.02½
BORAX	"	.07½@.07½
BROMINE—Bulk	"	.48
CADMIUM—Metallic	"	1.40
Sulphate	100 lb.	2.00@2.50
CALCIUM—Acetate, gray	"	1.87½
Acetate, brown	"	1.25
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton	65.00
Carbonate, ppt	lb.	.05
Chloride	100 lb.	.70@.90
CEMENT—		
Portland, Am., 400 lb.	bbl.	.90@1.25
Foreign	"	1.25@1.75
"Rosendale," 300 lb.	"	.80
Slag cement	"	.75@1.25
CERESINE—		
Orange and Yellow	lb.	.13½
White	"	.15
CHALK—Lump, bulk	sh. ton	3.00
Ppt. per quality	lb.	.04½@.04½
CHLORINE—Liquid	"	.30
Water	"	.10
CHROME ORE—		
(50%) ex-ship N. Y.	lg. ton	19.00@19.50
Bricks, f.o.b. Pittsburg	M	175.00
CLAY, CHINA—Am. com., ex-dock, N. Y	lg. ton	7.75@8.00
Am. best, ex-dock, N. Y.	"	9.00@9.25
English, common	"	11.00@11.25
Best grade	"	16.75
Fire Clay, ordinary	sh. ton	4.25
Best	"	6.00
Slip Clay	"	5.00
COAL TAR PITCH	gal.	.08
COBALT—Carbonate	lb.	1.75
Nitrate	"	1.50
Oxide—Black	"	2.50
Smalt, blue ordinary	"	.06
Best	"	.20
COPPERAS—Bulk	100 lb.	.47½
In bbls	"	.52½
COPPER—Carbonate	lb.	.18@.19
Chloride	"	.25
Nitrate, crystals	"	.35
Oxide, com'l	"	.19
CRYOLITE	"	.06½
EXPLOSIVES—		
Blasting powder, A	25-lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	1.40
"Rackarock," B	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitro-glycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for nitro	"	.11½@.11½
FELDSPAR—Ground	sh. ton	9.75@10.00
FLINT PEBBLES—		
Danish, Best	lg. ton	14.75
French, Best	"	11.75
FLUORSPAR—		
Lump	sh. ton	8.00@10.00
Ground	"	11.50@13.50
FULLER'S EARTH—Lump	100 lb.	.80
Powdered	"	.85
GRAPHITE—Am. f. o. b. Providence, R. I., lump	sh. ton	8.00
Pulverized	"	30.00
Am. pulv., other than R. I., f. o. b., New York	"	45.00
Best flake	"	150.00
Ceylon, common pulv	lb	.02½@.03½
Best, pulverized	"	.04@.08
German, com. pulv	"	.01½@.01½
Best pulverized	"	.01½@.02
Italian, pulverized	"	.01½
GYPSUM—Ground	sh. ton	8.00@8.50
Fertilizer	"	7.00
Rock	lg. ton	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—		
Ground Am. best	"	20.00
French	"	37.50
German	"	40.00
IODINE—Crude	100 lb.	2.45
IRON—Muriate	lb.	.05
Nitrate, com'l	"	.01½
True	"	.04
Oxide, pure copperas color	"	.05@.10
Purple-brown	"	.02
Venetian red	"	.01@.01½
Scale	"	.01@.03
KAOLIN—(See China Clay.)		
LEAD—Acetate, white	lb.	.08½@.08½
Brown	"	.06½@.06½
Nitrate, com'l	"	.06½
" granular	"	.08½
LIME—Com., abt. 250 lb.	bbl.	.80
Finishing	"	1.00
MAGNESITE—Greece.		
Crude (95%)	lg. ton	6.50@7.00
Calcined	sh. ton	16.50@17.00
Bricks, best imp., f.o.b. N. Y.	M.	155.00
Bricks, domes., per qual., f.o.b. Pittsburg	"	160@200
MAGNESIUM—		
Carbonate, light, fine pd.	lb.	.05
Blocks	"	.07@.09
Chloride, com'l	"	.01½
Fused	"	.20
Nitrate	"	.60
Sulphate	100 lb.	.55@.95
MANGANESE—		
Crude powd. 70@75% binoxide	lb.	.01½@.01½
75@85% binoxide	"	.01½@.02½
85@90% binoxide	"	.02½@.03½
90@95% binoxide	"	.03½@.05½
Carbonate	"	.16@.20
Chloride	"	.04
Ore	unit	.18@.20
MARBLE—Flour	sh. ton	6.00@7.00
MERCURY—Bichloride	lb.	.68
MICA—N.Y.gr'nd, coarse	sh.ton	33.00@38.00
Fine	lb.	.00½@.02
Sheets are sold as to size and quality.		
MINERAL WOOL—		
Slag, ordinary	sh. ton	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
NICKEL—Oxide, No. 1	lb.	1.00
No. 2	"	.60
Sulphate	"	.20@.21
OILS—Black, reduced 29 gr.		
25@30, cold test	gal.	.11@.12
15, cold test	"	.12@.13
Zero	"	.16½@.17½
Summer	"	.11@.12
Cylinder, dark steam ref.	"	.12½@.14
Dark, filtered	"	.16½@.17½
Light, filtered	"	.18½@.19½
Extra cold test	"	.23@.30
Gasoline, 86@90	"	.17@.22
Naphtha, crude, 68°@72°	bbl.	12.40
"Stove"	gal.	.15
Linseed, domestic raw	"	.40@.41
Boiled	"	.43
Calcutta, raw	"	.55
OZOKERITE	lb.	.11½
PAINTS AND COLORS—		
Chrome green, common	"	.03
Pure	"	.16
Yellow, common	"	.10½
Best	"	.14
Lampblack, com'l	"	.04½
Refined	"	.07
Litharge, Am. pow'd	"	.05½@.06
English glassmakers'	"	.08½@.08½
Lithophone	"	.02½@.06½
Metallic, brown	sh. ton	19.00
Red	"	16.00
Ocher, Am. common	"	8.50@9.00
Best	"	16.00
Dutch, washed	lb.	.02½
French, washed	"	.01½@.01½
Orange mineral, Am.	"	.07½@.08
Foreign, as to make	"	.07@.10½
Paris green, pure, bulk	"	.11
Red lead, American	lb.	.06½@.06½
Foreign	"	.07@.08½
Turpentine, spirits	gal.	.51½
White lead, Am., dry	lb.	.05@.05½
American, in oil	"	.06@.06½
Foreign, in oil	"	.09@.09½
Zinc, white, Am., extra dry	"	.04½@.04½
Foreign, red seal, dry	"	.06@.08½
Green seal, dry	"	.06½@.09½
POTASSIUM—		
Bicarbonate cryst.	lb.	.08½
Powdered or gran.	"	.14
Bichromate, Am.	"	.08½@.08½
Scotch	"	.08½@.08½
Bromide	"	.30
Carbonate (80@85%)	"	3.50@4.00
Caustic, ordinary	"	.04½
Elect. (90%)	"	.06½
Chlorate, powdered	"	.08½@.08½
Crystals	"	.08½@.08½
Chromate	"	.35
Cyanide (98@99%)	"	.19@.20
Kainit	lg. ton	9.30
Manure salt, 20%	100 lb.	.66
Double Manure Salt, 48@53%	"	1.12
Muriate, 80@85%	"	1.83
95%	"	1.86
Permanganate	lb.	.09½@.09½
Prussiate, yellow	"	.13½@.14
Red	"	.35½@.36
Sulphate, 90%	100 lb.	2.11
96%	"	2.14
Sylvinit	unit	.41
QUARTZ—(See Silica.)		
SALT—N. Y. com. fine 280 lb.	bbl.	.72@1.18
N. Y. agricultural	sh. ton	4.40
SALTPETER—Crude	100 lb.	3.90
Refined	"	4.00@4.50
SILICA—		
Ground quartz, ord'ry	sh. ton	9.00@10.00
Best	"	12.00@13.00
Lump quartz	"	2.50@4.00
Glass sand	"	2.75
SILVER—Chloride	oz.	.65
Nitrate Crystals	"	.37
Oxide	"	.85@1.10
SODIUM—		
Bicarb., ord., bulk, f.o.b. works	100 lb.	1.30
Extra domes, f.o.b. works	"	3.50
Bichromate	lb.	.06½
Carbonated ash, high test, in bags, f.o.b., works	100 lb.	.75@.77½
Foreign, f.o.b. N. Y.	"	.85@.87½
Caustic, 70@76%, f.o.b. works	"	1.75@1.85
Foreign, f.o.b. N. Y.	"	1.90@1.95
Chlorate, com'l	"	.08½@.08½
Hyposulphite, Am	"	1.50@1.60
German	"	1.75@2.00
Peroxide	lb.	.45
Phosphate	"	.02½@.02½
Prussiate	"	.09½
Sal soda, f.o.b. works	100 lb.	.60
Foreign, f.o.b. N. Y.	"	.67½
Silicate, concentrated	lb.	.05
Com'l	"	.01
Sulphate, com'l	100 lb.	.65
Sulphide, crystals, bbl.	lb.	.01½
Sulphite crystals	"	.02½
SULPHUR—Roll	100 lb.	1.85
Flour	"	1.90
Flowers, sublimed	"	2.20
TALC—N. C., 1st grade	sh. ton	20.00
N. Y., Fibrous, best	"	10.25
French, best	lg. ton	25.00
Italian, best	"	30.00
TAR—Regular	bbl.	2.25
Oil bbl. (50 gal.)	"	5.20
TIN—Crystals, bbl.	lb.	.22
Oxide	"	.35
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic, ch. pure	"	.07@.09½
Carbonate, ppt	"	.09
Chloride solution, com'l	"	.02½
Chloride granular	"	.04½@.04½
Dust	"	.05@.05½
Sulphate	"	.02 @.02½

The Rare Earths.

BORON—Nitrate	lb.	$1.50
CALCIUM—Tungstate (Scheelite)	"	.60
CERIUM—Nitrate	"	10.00
DIDYMIUM—Nitrate	"	35.00
ERBIUM—Nitrate	"	40.00
GLUCINUM—Nitrate	"	20.00
LANTHANUM—Nitrate	"	30.00
LITHIUM—Carbonate	"	1.50
LITHIUM—Nitrate	oz.	.60
STRONTIUM—Nitrate	lb.	.07@.07½
THORIUM—Nit. 49@50%	"	4.50
URANIUM—Nitrate	oz.	.25
ZIRCONIUM—Nitrate	lb	8.00

NOTE.—These quotations are for wholesale lots in New York, unless otherwise specified, and are generally subject to the usual trade discounts. Readers of THE ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.